This copy is a gift from your BIG D fertilizer dealer. He will help you plan your farming program for greater profits.

Ray L. Pavlak, President

DAIRYLAND FERTILIZERS, INC.

Contents for March 1959

Plant Food Profit	Missouri Ruralist	1
Certified Seed Pays Big	The National Future Farmer	4
Fertilize Field Crops for More Profit	Research Report	7
The Elusive Element	Crops & Soils	9
How Much Fertilizer Can You Afford?	The Furrow	12
Why Corn Lodges	Better Crops	14
Report on Feed Additives	Successful Farming	15
Have More Pasture This Year	Massey-Ferguson Farm Profit	20
Pacemaker Hog Program	Breeder's Gazette	23
How's Your Plant Population?	The Young Farmer	26
Fun On The Farm	Collected	33
How Minimum Tillage Pays	Prairie Farmer	35
The New "Porklet"	Clemson Agricultural College	38
Bulls for Dairy Bred Beef	Farmer and Stock Breeder	39
Lime to Save Potash	Research and Farming	43
Winter Dysentery May Hit Dairy Cows*	Illinois Extension	44
New Sod Crops for Your Cornfield	Farm Journal	45
Shall We "Correct" Fertilizer Formulas	Minnesota F. B. Indicator	47
Did Your Soil Sizzle?	New Mexico News	49
You Need More Coarse Lime*	Purdue University	50
What Does It Cost to Raise Corn?	Plant Food Review	51
Winter Dairy Herd Care*	Farm News	57
Chimney Smoke	Irene Rudie	58
Subsoil Rippers on Level Ground	The Farmer	59
Use Your Woodlot Wisely	Wisconsin Agriculturist	61
Fall Fertilization Gives Crops a Boost	Indiana Farmer's Guide	63
Self-Fed Lamb Rations Promote Fast Gains*	Indiana Extension	64
How Much Can Poultrymen Expand?	Michigan Farm Economics	65
Fertilizer and Water: Winning Farm Team	Better Farming Methods	67
Split Boot—Out-moded Applicator*	American Potash Institute	69
Soil Acidity and Vegetables	Agricultural Gazette of New So. Wales	70
You Can Farm More Efficiently	Science For The Farmer	73
Silage and Moisture	The Kraftsman	75
Interpreting Soil Tests	Better Crops with Plant Food	77
Making a Compost Pile	Pennsylvania Farmer	81
Care for Pigs Before You See Them	National Livestock Producer	83
Should You Fall or Spring Plow?	Wallace's Farmer	89
Mastering Molds in the Soil	Ohio Farm and Home Research	91

*Short Features in this Issue. One Year Continuing Index, **pages 94 & 95**

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Associate Editor—D. W. Scheid
Livestock Editor — Al Haller
Office Manager — V. M. Binkert
Industry Sales Representative — Raymond C. Groendyke
Subscription Service — E. M. Hartwig
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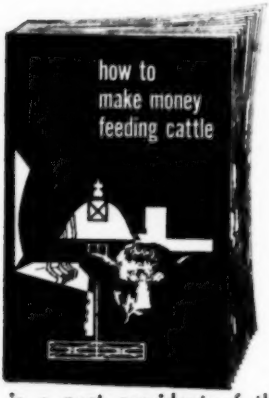

MAKE MORE MONEY WITH CATTLE THIS YEAR

This brand new book — "How to Make Money Feeding Cattle" — can help you make money. Even feeders with long experience are sure to find much useful information in it.

Its recommendations are based on extensive studies by farm experiment station workers, the advice of specialists, and practical experience by two foremost authorities. L. H. Simerl, farm economist, is widely known for his writings of the weekly outlook letter from the University of Illinois, and for his farm radio programs.

Bruce Russell, president of the world's largest farm management company in Omaha, Nebraska, is a past president of the American Society of Farm Managers and Rural Appraisers. Mr. Russell's experience is in the practical end of cattle feeding in two cattle states.

The book will be useful reference book for vocational-agricultural teachers, county agricultural extension agents, sales managers and others who work with farmers. But, most particularly, it is designed for the average cattle feeder on the general farm. It brings him the knowledge and practical hints of cattle feeding which will make it possible for him **to make money, time after time, in his cattle feeding operation. It is especially designed to help him adapt his own cattle program to the type of cattle feed his farm produces.**

An attractive book with a two-color cover, printed on good quality paper, consisting of 166 pages with over 40 informative charts, pictures and illustrations. As a reference, you will refer to it for many years in your cattle feeding operations. One copy is $2.50; 6, $2.25; 12, $2.00; 25, $1.75; 50, $1.65; 100, $1.50; 250, $1.37; 500, $1.25; 1,000, $1.00 each.

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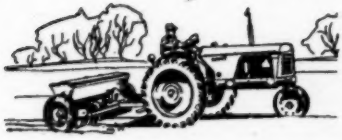
The Farmer's Digest

Volume 22 March 1959 Number 9

Plant Food Profit



In Missouri, they say fertilizer pays back $3 for every $1 invested . . .

Condensed from Missouri Ruralist

HOW good an investment is commercial fertilizer?

Rule of thumb established by Missouri College of Agriculture thru the years is $3 return for every dollar invested. W. C. Kittle, Queen City, Missouri, has demonstrated this is a good figure. In recent years he has realized a return of $3.20 for every dollar spent for fertilizer.

Furthermore, he has the records to prove it. In fact, you'll seldom find a more complete fertility accounting system than that exhibited by him.

Most dramatic part of Mr. Kittle's set of records is the increase shown in gross return from the fields on his 160-acre farm. In a 6-year period of growing seasons from 1944 to 1949 inclusive, Mr. Kittle spent $474.96 a year for fertilizer. Gross return was $7,487.19 a year, average.

In a more recent 6-year period, from 1950 to 1955, he spent $1,777.66 a year for fertilizer. Gross return during this time averaged $11,655.52 annually.

Mr. Kittle's system of record keeping is quite simple but most complete. He has a loose-leaf notebook, the type used by school pupils. In the front of the book he has a map of his farm and every field is designated by a number and letter. He uses a system like that used in highway maps for locating towns — numbers are used across the top, letters down the side and fields are given symbols such as 2A, or 4D.

In the notebook each field has a file. Soil tests are filed here, as well as a complete year-by-

Reprinted by permission from Missouri Ruralist, Fayette, Missouri

year record of the plant food treatment, crops grown, yield, return.

Thus, Mr. Kittle not only has one of the most striking demonstrations as to the value of heavy applications of plant food, he has definite proof to back all his statements.

For the last 4 years a field day has been held at the Kittle farm. Watermelon aplenty is an extra inducement for visitors. The Missouri Agricultural Extension Service also has co-operated in presenting programs at the field day. This year John Falloon, Extension soils specialist, was guest speaker.

Amounts of plant food applied on this farm have been considerable. All are based on soil tests, of course. The 1957 budget for fertilizer expenditures was $3,235.24.

This year Mr. Kittle had 34 acres in corn. No yield checks had been made at time of the field day early in September, but it was the opinion of visitors the corn would make well over 100 bushels to the acre.

Mr. Falloon, commenting on use of fertilizer to increase yields, noted commercial plant food can be used to double yields in general — but that from then on other management factors need to be watched closely.

The Kittle farm is not a cash grain farm—it's a livestock farm. How is the increase in yields in crops converted into profit? At present Mr. Kittle has a herd of 17 Shorthorn cows. His goal is 30 brood cows. He will combine these with 20 brood sows to utilize the corn produced.

One field is being prepared for a "rotation" of continuous corn. It is more level than other fields. How long can corn be grown on one field? Mr. Falloon was of the opinion there may be a limit, even tho sufficient plant food is returned to the soil to make up for that removed by the corn. But this limit is not under 10 years, in his opinion.

Pastures have benefited just as much under this fertility program as has grain. Tests were conducted this year on a field fertilized with different treatments to see the results on growth of grass. Actually, measuring the response to grass is difficult as the trick is to utilize the increase in growth.

As Mr. Falloon points out, the desirable thing is to get the extra growth when you need it most. In general, legumes make more growth with phosphate and potash applications, grass responds to nitrogen. Nitrogen also will give early growth of grass in spring.

In test plots on the Kittle farm, grass with no treatment did well this year—with a yield of 19,000 pounds of grass (wet) to the

acre. Grass that got 90 pounds of nitrogen alone to the acre yielded 34,000 pounds. Grass that received 90 pounds of nitrogen, phosphate and potash, yielded 52,500 pounds.

Grass Is Good!

These are comparative figures from 2 clippings, should not be considered as actual yields of grass, altho the grass is good on this farm and grows in abundance.

Incidentally, the American Plant Food Council supplied a grant for the study of fertilization of the grass.

In addition to the increase in gross returns, and net returns from use of commercial fertilizer there has been another factor to consider. There has been a big increase in sale value of the land.

Mr. Kittle has been offered 3 times what he paid for the farm in the early 'forties. Land values have gone up but nothing like that!

Corn and 1960 Elections

In 1959 you can raise all the corn you want and you are guaranteed a higher price of $1.14 — *if you have storage.* So corn net income will be up a little in 1959. But this leads to the next problem of additional storage, if you want to raise a lot more corn. Our advice: *Do not build a lot of extra storage until after 1960 election.* Why?

A complete Democratic sweep appears very likely in 1960, and complete control by Democrats from 1960-64. So what? Look at how the Democrats in the Solid South have solved their surplus cotton, rice, and tobacco problem. Very rigid, small, and mandatory acre allotments for each farm. So, if the Democrats sweep the 1960 election they will then try to put into effect the same small allotment system in the Corn Belt. If this is done, you won't need more corn storage because you won't be allowed to grow it. Past allotments were about 25% of tillable acres and it produced surplus. So, a Democratic Secretary of Agriculture in 1961 will probably cut mandatory corn allotments to about 15% to 20% of tillable acres or a little less, or base it on a historical acreage so it will not produce a surplus. So, we advise build no more corn storage until after the 1960 election and the new Democrat agricultural act of 1961 is enacted for the Corn and Bean Belt.

—From Farm Facts, published by Dowell Agricultural Specialists, Champaign, Illinois

Certified Seed Pays Big

A "certified tag" is your guarantee of clean seed, better stands and higher yields . . .

Condensed from The National Future Farmer

"GOOD CROPS start with good seed" might well be the slogan of certified seed users. Tests indicate farmers may increase yields of most crops by 25 per cent with these genetically pure seed.

Most corn, grain, and grass seeds look very much alike. It's extremely difficult to spot quality with the naked eye. But you CAN spot the *certified* tag which guarantees:

1 **Higher germination percentage**
2 **Increased disease resistance**
3 **Easier harvesting**
4 **Better milling quality**
5 **Resistance to lodging**

"Use of certified seed is the only assurance a farmer has that his seed is true to the variety name," explains West Virginia Agronomist R. J. Friant.

Plant scientists and crop improvement agencies have developed this certification process for the farmer's protection. Most local seed dealers sell certified seed. Smart farmers are buying them.

High Standards

Some farmers fail to realize the value of a certification tag. They often figure there's a chance for someone to tamper with it between packing and selling. But Laverne Powell, manager of Wyoming's seed certification service says, "These seed are marketed with an official seal which must be broken when the container is opened. This is the farmer's guarantee."

Certification is not a simple process of just "labeling the seed." It is much like obtaining pedigree records for purebred livestock. Seed history must be traced to the variety's original distribution. Then crops must undergo important field and laboratory inspections. Friant says, "Most states will certify only varieties which have been tested by experiment stations and branded 'su-

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perior.' They must be free from injurious weeds and have a high germination percentage."

Inspections will vary among crops. Some specialized crops may require inspection in the seedling stage or even during storage. Legumes are checked in the field during the blossom stage; small grains after heading; and hybrid seed corn must be inspected several times.

Is It Worth It?

Certified seed costs more than a neighbor's year-old seed stock. But it is a much more profitable investment.

One Georgia farmer recently said, "I learned my lesson about poor seed the hard way with bad stands, poor yields, and a large number of weeds. I figure farmers are foolish to save a dollar or two on poor seed when their cost of seed bed preparation, fertilizer, planting, and cultivating usually runs $30 an acre."

More and more farmers are agreeing. Last year certified seed producers released 68 million pounds of grass seed; 89 million pounds of legume seed; nearly 14 million bushels of small grain; and about three million bushels each of corn and sorghum seed.

Carlton Garrison, head of the USDA's Agricultural Research Service Seed Products Section offers this recent test result: "In Minnesota and Indiana, 21 lots of certified Ranger alfalfa were planted alongside 163 lots of non-certified Ranger. Results were graded on fall growth habit and bacterial wilt resistance. Less than 10 per cent of certified seed crops failed to meet minimum standards while over 55 per cent of the non-certified lots fell short."

Since seed certification has proven to be a reliable system of seed identification, the service makes it possible to grow certain crops successfully out of their adapted areas. Northern varieties can be grown in Southwestern states if planting stocks originate in the north.

Corn, wheat, oats and rice all go by the name 'corn' in various parts of the world. The corn of the Bible was wheat or rye.

What's the Trouble?

So the current practice of seed certification is good! It will actually make money for the farmer by increasing his yield! Resulting crops will harvest easier! Why, then, doesn't 100 per cent of American farmers plant certified seed?

It will take time. The program is constantly growing. Today 44 states and Alaska have active seed certification programs. A Nebraska survey revealed that 68 per cent of small grain farmers in

that state were producing their own seed and 25 per cent relying on neighbors for seed stock. Only four per cent were utilizing a seedsman. Another test indicated that seven per cent of Georgia farmers used second generation hybrid seed corn from their own crib one year—and suffered a 21 per cent yield reduction.

Today's authorities heartily recommend the use of certified seed. They are not a cure-all for poor farming or improper management practices. Scientific farmers say the best seed is always cheapest in the long run.

Banded Fertilizer Boosts Wheat Yields

Place fertilizer for wheat in a separate band below and alongside the seed and you'll harvest four bushels more per acre.

That's what Michigan State University scientists did for three years in a row. Their band-fertilized wheat averaged 55 bushels per acre, while regular seedings made only 51.

The scientists used a field bean drill with fertilizer attachments that put the band two inches below and one inch to the side of the seed.

"Separate fertilizer placement helps wheat for the same reason that it's catching on so fast with corn and beans," says scientist R. L. Cook. "Today's higher rates of more concentrated plant foods add up to several times more soluble salts, and can kill the seedlings in a dry year."

This fertilizer injury doesn't usually show up when moisture is plentiful. For example, the Michigan scientists didn't get their four-bushel increase in areas that got normal fall rains.

But in drier areas, they got a 40% reduction in stand when they put more than 80 units of plant food (for example, 180 pounds of 5-20-20 per acre) in with the seed. In one test, scientist J. R. Guttay put 500 pounds of a high-analysis fertilizer in with the seed and got only a 20% stand.

Big stumbling block right now is how to place the fertilizer in a separate band when the grain drill disks are only seven inches apart. Offset drill shoes behind an extra set of disks might be the answer.

Or, say the Michigan scientists, we may some day go to an 11-inch spacing for wheat. They find it doesn't cut yields. Then you could use the same drill to plant your corn and soybeans.

—Farm Journal

Fertilize Field Crops for More Profit

In Florida, higher yields of corn, cotton, oats, soybeans peanuts and pastures pay off . . .

Condensed from Research Report

William L. Pritchett, University of Florida

ARE you caught in the squeeze of rising costs and falling farm prices? Want to up your yields of corn, cotton, oats, soybeans, peanuts, pasture?

Our advice: In time of falling prices—to economize, fertilize. In other words "Don't be a miser—with your fertilizer."

Many factors contribute to higher crop yields, such as good seedbeds on suitable lands, using recommended seed varieties, rates and dates; weed, insect and disease control—and feeding the crop what it needs at the right time.

Experience has shown that one of the easiest ways to increase yields is by proper fertilization. This involves testing the soil to see what plant foods are already present; determining the amount of plant food required to produce that higher yield; and supplying the difference between what the soil can supply and what crops need by fertilization at planting time or by sidedressing.

On the majority of our Florida high value crops—fruits and vegetables—high rates of fertilization already are used. Proper fertilization, therefore, does not necessarily mean the use of still larger amounts of fertilizer. Rather, it means using the proper balance between the major and secondary plant nutrients.

For example, phosphorus has accumulated in many soils to where it may be omitted from the fertilizer mixture for years to come.

On the other hand, thousands of acres of field crops and pastures never receive a pound of fertilizer, and other thousands receive only low rates. This is one reason average field-crop yields are low.

Sandy soils are inherently low in native fertility, but highly productive when properly managed. For instance, in 1953, the average application of fertilizer on Florida corn fields was about 35 pounds per acre. The average yield was 16.5 bushels.

Average fertilizer applications and state corn yields have in-

Reprinted from Research Report, Agricultural Experiment Stations, University of Florida, Gainesville, Florida

creased notably in the past three years. However, yields are still far below optimum.

In Experiment Station tests, an average of only 140 pounds of fertilizer per acre was applied to certain fields, but the average yield was upped to 45 bushels per acre.

In cotton the same year, average state yield was 182 pounds of lint per acre when an average of 86 pounds of fertilizer per acre was supplied. Experiment Station tests upped this average to 150 pounds of fertilizer per acre and yield jumped to 400 pounds of lint per acre.

Oats, soybeans, peanuts all showed good yield responses when the average fertilizer application was raised by Experiment Station testers. Oats averaged 20 bushels more per acre; soybeans rose to an average of 30 bushels from 18 bushels per acre; and peanuts rose from an average of 975 pounds per acre to an average of 1,300 pounds an acre.

When the testers applied an average of 200 pounds of plant feed per acre on pasture, the average number of cow-days per acre was 300. Previously, census reports show, the average was 165 cow days per acre for an average application of 39 pounds of fertilizer per acre.

Money gains possible by proper fertilization are very high. Cost of fertilizer per extra unit on a corn crop in Florida was 44 cents a bushel—and the possible profits amounted to $30.21 an acre. On cotton, the cost per extra pound of lint was only 4 cents, but the possible extra profit per acre was $58.86. Oats, soybeans, peanuts and pastures showed similar possibilities.

Farm profits depend on high yields per acre — especially important during periods of low farm prices. Since the unit cost of production is related to yield, the higher the yield the lower the cost per unit and the better the net income. For example, a farmer producing 45 bushels of corn per acre instead of the state average of about 21 bushels might have a production cost of about 85 cents instead of $1.25 a bushel. If the farmer sold his corn at $1.25 a bushel, the one having the high yield would make a profit of about $18.00 per acre, while the farmer producing the low yield would gain nothing for his efforts. If it sells higher, he makes more; if it sells lower he loses less.

In terms of proportion of income spent for food, U. S. citizens have never eaten so well for so little, according to the U. S. Department of Agriculture.

The Elusive Element

Nitrogen escapes if not used by crops the first year; timely application usually brings greater efficiency . . .

Condensed from Crops and Soils

L. T. Kurtz, Prof. of Soils
University of Illinois

NITROGEN is probably deficient on more soils than any other fertility nutrient, and when nitrogen is deficient, yields can really be hurt.

Unfortunately, efficient use of nitrogen fertilizer is still more of an art than a science. Crop requirements for nitrogen are sizeable and may be a noticeable part of production costs. If your crop needs nitrogen, you can't risk getting along without adding plenty. Yet, if you add more than the crop uses, the extra is probably lost.

Nitrogen is an exception among fertilizer nutrients. Long-lasting reserves of nitrogen do not appear to "build-up" directly by simple addition of highly-soluble nitrogen fertilizers. Excess amounts of phosphorus or potassium become a part of the soil supplies. If not used the first year by crops, phosphorus or potassium stay put in most soils and become a part of the soil fertility "inventory." The build-up of phosphorus or potassium will eventually register in the soil test.

Nitrogen fertilizer has several avenues of removal from the soil. The avenue into the crop is more likely to be traveled, if the crop is growing rapidly when the nitrogen goes into the soil. The longer the nitrogen is in the soil ahead of the crop, the more probable is removal by another route. For example, the most efficient time of applying nitrogen on corn is usually as a side-dressing at second cultivation—*if the weather cooperates.*

Other avenues of escape for nitrogen are leaching (drainage down through the subsoil); denitrification (change of nitrates into gas through loss of nitro-

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gen), and uptake by soil microorganisms, clay minerals, and organic materials.

Weather is an unreliable cooperator. In a dry summer, nitrogen from a late side-dressing tends to stay at the surface of the soil and be of little value to the crop. In a wet summer, cultivations are delayed and the corn grows rapidly. Neither the cultivator with the side-dressing attachment nor the anhydrous applicator can get into muddy fields and the corn is soon too tall. Applications postponed until the second cultivation are often postponed forever.

In most years, earlier side-dress applications usually give high increases per pound of nitrogen fertilizer, with little possibility of weather preventing the application.

Another disadvantage of side-dressing is that it must be done during the busy time. With early summer work, hay-making, and wheat combining waiting to be done, many farmers hesitate to hamper corn cultivation with the nitrogen application.

Plowdown applications are preferred by many farm operators because labor and machinery are not as busy. Nitrogen fertilizer may be spread immediately before spring plowing, or in the northern part of the United States, nitrogen fertilizer is often broadcast on frozen fields during the winter and plowed down when spring weather permits.

Efficiency of these winter applications is controversial for corn even in the North Central region. Nitrogen applied at seeding time with winter wheat, however, has usually given results comparable with spring top-dressing, except on poorly or excessively drained soils.

For winter grains, application of all fertilizer, including nitrogen, at seeding time is preferred from the standpoint of convenience. Top-dressing in the spring requires a special trip over sometimes muddy fields. When weather conditions are right, modern equipment makes top-dressing a rapid operation.

An inventory of your soil now will provide a basis for planning a fertilizer program which will supply needed plant nutrients and help your crops produce nearer their yield potential. A soil test will give this inventory.

Large quantities of fertilizers required to maintain fertility or correct deficiencies in highly productive soils are conveniently broadcast by truck or pull-type spreader in the winter after harvest. This application, based on soil tests and other information, may contain the major part of the phosphorus and potassium

needed for as long as a full rotation. In the North Central Region, this application may also include the nitrogen needed for the following corn crop. If bulk or liquid "formulations on a prescription basis" are used, a single trip over the field saves time and spreading costs. Larger amounts of nitrogen are usually applied when winter applications are made.

Winter application of nitrogen for next summer's corn would be recommended only where the prevailing climate is likely to be cold or dry. This practice is rarely recommended in the southern three-fourths of the eastern United States where winters are normally mild and humid. Winter applications would probably not be efficient on sandy soils.

Different nitrogen carriers, such as urea, anhydrous ammonia, nitrogen solutions, ammonium nitrate, ammonium sulfate, and others, are generally equally effective when equivalent amount of nitrogen are used. For winter application, ammonium forms are preferred since they do not leach as much in cold weather.

The impression that nitrogen fertilizer retards maturity is incorrect. This view has frequently been expressed in older textbooks, and is still widely quoted. Actually, a nitrogen-treated crop may ripen earlier and contain less moisture at harvest.

As a general rule, *supplying a deficient nutrient will hasten maturity* and any fertilizer that promotes greater yields also promotes more rapid growth and maturity. Nitrogen is not an exception. If normal rates of nitrogen delay maturity, a severe deficiency of some other nutrient, perhaps phosphorus, has probably been overlooked.

New Mulcher Boosts Yields

The new vertical mulcher is a machine that breaks up hardened soils and lays channels of mulch in the ground. It chops crop residue and places it deep in the soil. In a recent test, one plot of alfalfa was vertically mulched, one subsoiled and a third untreated. The respective yields in a September cutting were 2,420, 1,525 and 1,470 lbs. of dry matter per acre. The machine combines a residue chopper, a blower and a modified subsoiler. The subsoiler is equipped with wings that hold earth back from the furrow. In the test, windrowed straw was chopped up and forced by air into the furrow opened by the subsoiler. The machine was developed at the University of California at Davis. —*Farm Management*

How Much Fertilizer Can You Afford?

"Most profit per acre from fertilizer occurs when the last pound added increases the yield enough to pay its cost . . .

Condensed from The Furrow

ECONOMICS is a part of every fertility program — you fertilize to make a profit. The main problem is deciding how much fertilizer you can most profitably use. Keep the following principle in mind:

The most profit per acre from the use of fertilizer occurs where the last pound added increases the yield enough to pay its cost.

With the four rules discussed below, and assuming average weather conditions, you can figure out just when the last pound of fertilizer should pay its cost.

1. Crop Response

How do crops on your farm respond to different rates of fertilizer? If you don't know, test the soil and study fertility trials conducted in your area by the state agricultural college. Run your own check plots to be sure.

2. Fertilizer Cost

This figure you can pretty well nail down. Be sure to include the cost of application along with the cost of the actual plant food applied. And, remember, much of the cost of fertilizer is freight —shop around for high-analysis fertilizers, they're the best buy.

3. Crop Value

How much will the crop be worth at harvest time? This, of course, is just a guess, but it serves as a guide. You can afford to invest more capital in fertilizer when you think corn will sell for $1.20 a bushel as compared with $1.00.

4. Other Costs

Don't overlook them. When you produce more, it's going to cost more to harvest and store it. These costs are real and should be included in your figuring.

In a corn-fertility trial conducted on a western Corn Belt farm, corn in eight test plots was given 60 pounds of phos-

Reprinted by permission from The Furrow, Moline, Illinois

phorus and 25 pounds of potash per acre plus varying amounts of nitrogen ranging from 0 to 160 pounds per acre. Corn yields increased from 53 bushels per acre with no nitrogen to 103 bushels per acre with 160 pounds of nitrogen. Each additional 20 pounds of nitrogen increased the yield, but increases were smaller and smaller as the corn approached the maximum amount of nitrogen it could use. This is the kind of fertilizer response information you need.

The phosphorus and potash cost $7.49 an acre applied. Each 20 pounds of nitrogen cost $3.44. You can estimate costs like this from your own experience and from prices you will have to pay for fertilizer.

For example, if corn selling price is estimated at $1.20 per bushel and assuming that you are in an *unlimited* capital position, you could afford to use 120 lbs. of nitrogen per acre. At that level, the last 20 pounds of nitrogen added in the trials increased the yield by 3 bushels, or by $3.60 worth—enough to pay for the additional $3.44 worth of nitrogen. If the estimated price of corn is $1.00 per bushel, the 100-pound application becomes the most profitable level.

At either price, consider the other costs involved. How efficient is your harvesting system, how adequate are your storage facilities? Make sure the extra return will cover all of the extra costs involved. Don't produce more than you can harvest and store profitably.

If, on the other hand, you are in a *limited* capital position, add fertilizer until the last unit gives the same return as some alternative use of your money, such as buying new equipment to reduce costs. The lower rates of fertilizer used will not give maximum profit per acre but will give a higher return per dollar invested.

Two ministers, arguing about their respective faiths, were in a heated discussion. "That's all right," said one, calmly. "We'll just agree to disagree. After all, we're both doing the Lord's work—you in your way and I in His."

Everything said here must be considered in terms of your own farm business. For example, let's say corn is valued at $1 per bushel and a farmer intends to plant 80 acres. Perhaps he can afford to apply only 50 pounds of nitrogen per acre even though he has figured that 100 pounds is his best rate. With a sharper pencil he might discover that it would be more profitable to apply 100 pounds to half his corn acreage and none to the rest. He alone,

considering his costs, can make this decision. We cite it as an example of the various aspects to the problem.

Fertilizer, of course is not the entire answer. It takes good management and careful consideration to all the agronomic practices involved, such as adapted varieties, plant populations, weed and insect control. Properly used, however, fertilizer is still one of the best investments a farmer can make.

CORN LODGING
If You Have it, Here Are Some Reasons

Corn lodging and stalk breakage can't be pinned down to any single cause.

It can result from one or a combination of several things, according to Charles Simkins, extension soils specialist, and Herbert Johnson, extension plant pathologist at the University of Minnesota.

Some of the causes include:

1. *Root and stalk rot.* Fungus organisms called Giberella and Diplodia are the most important causes of root and stalk rot.

2. *Insect damage.* Corn borers, corn root worms, wireworms and other insects may weaken stalks, causing them to finally break and drop the ear. Also, the entrance made by an insect in plant tissue allows an easy pathway for root and stalk rotting organisms.

3. *Nutrient balance.* When the fertility level of soil is out of balance—especially when potash level is low—stalk rot may develop faster and cause more lodged plants. Also, research and observation indicates that applying nitrogen alone favors stalk rot.

4. *Plant populations.* Stalk breakage and lodging increases when there are more than 18-20,000 plants per acre. Stalks are smaller, generally taller and more susceptible to breaking at high populations.

5. *Corn variety.* Different varieties vary in their standing ability, an important factor in lodging. Some plants apparently contain soluble substances which slow growth of some stalk rotting fungi.

6. *Treatment with 2, 4-D.* This herbicide sometimes causes brittleness when sprayed on corn for a period of about 10 days following treatment.

Johnson and Simkins add that soil and weather also affect corn lodging. They say the greatest hope for a solution is in using resistant hybrids, insect control, proper fertilizing, using plant populations, and good management. —*Better Crops*

Report on Feed Additives

What they are, why they work, and how you can use them. Here's what authorities say . . .

Condensed from Successful Farming

Mike Bay

HERE'S the latest on feed additives in beef rations. Four additives—diethylstilbestrol, Dynafac, antibiotics and hydroxyzine (a tranquilizer)—have been approved. Another additive, Tapazole, looks promising.

These drugs may provide that needed boost to keep your cattle-feeding operation in the black. Here's what they are, why they work, and how they're being used.

What is Diethylstilbestrol?

Diethylstilbestrol is a man-made synthetic chemical compound that has female hormone properties. It has been used in human medicine for a number of years and more recently has been used to caponize cockerels in the poultry-feeding industry.

Diethylstilbestrol was first prepared by British chemists and reported in 1937. Since that time, many other powerful estrogenic (female hormonelike substances) have been prepared. Among these are hexestrol and dienestrol.

Why is Diethylstilbestrol Used in Feed-Lot Rations?

Diethylstilbestrol, used in beef cattle, stimulates growth. There are two methods of administering it—either by implanting the pellet form at the base of the ear at the beginning of the feed-lot period, or by feeding it each day in the ration. The use of the female hormonelike materials resulted in increased gain and increased utilization of feed. The use of diethylstilbestrol in cattle-feeding operations has become quite well established.

Tests at various experiment stations have shown that you can expect a 17-19% faster gain with a saving of 10-11% in feed per pound of gain. The usual recommended amount is 36 milligrams implanted in the ear or 10 milligrams fed per steer per day.

How Does Diethylstilbestrol Work?

The method by which diethylstilbestrol (DES) and other fe-

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male hormonelike materials affects growth is not known. However, since a tiny gland in the geometrical center of the head —known as the pituitary gland— exerts a very definite effect on growth, it is reasonable to believe that the growth effect of DES may be the result of either a direct or indirect effect on the pituitary gland. This gland affects many parts of the body such as the male and female reproductive organs, the thyroid gland and the adrenal glands, as well as affecting rate of growth and mammary gland (milk production).

What Are Antibiotics?

Technically, an antibiotic is a compound produced by one type of microscopic life which inhibits the growth or activity of another type of microscopic life.

Some people absorb gossip like blotters. They soak it up, but get it all backward.

Antibiotics are classed as *drugs* and not as nutrients. Under commercial conditions, the production of antibiotics results from carefully controlled fermentation by microorganisms or molds.

Antibiotics are commonly used in human medicine for the control of a wide variety of infections such as colds, pneumonia, skin infections, and the like.

Why Are Antibiotics Used in Feed-Lot Rations?

The use of antibiotics in beef cattle has certain advantages. It appears that the use of antibiotics may aid in the control of shipping fever in cattle. Antibiotics are effective in controlling scours and in stimulating growth rate of some suckling calves.

Under some conditions, the use of antibiotics has resulted in increased daily gain over and above that obtained by the use of diethylstilbestrol. Antibiotic-fed cattle can be expected to show a better hair coat, carry a better finish, and dress out a higher grading carcass than cattle not fed antibiotics.

How Do Antibiotics Work?

The "medicinal" effect of the antibiotics on microscopic life in the intestinal tract is the most obvious explanation for its growth-stimulating effect. One fact to support this theory is that a number of different antibiotics will affect growth but they have no special demonstrated properties in common. Also, it has been demonstrated that antibiotics will exert little or no growth-stimulatory effect on animals that are raised in new quarters where animals have never been raised before.

What Are Tranquilizers?

Tranquilizers are a group of drugs that have been used for many years in the medical pro-

fession for the purpose of relieving tensions and anxiety. Certain roots contain natural sources of tranquilizers and thus might well be responsible for a portion of the success of certain "root" doctors. Perhaps even the famous "witch doctors" unwittingly stumbled onto this source of material to quiet and soothe their patients centuries ago. The tranquilizers can bring about complete sedation, or sleep, in animals when administered in large enough doses.

Why Used in Feed-Lot Rations?

Advantages of tranquilizers for beef cattle are still being investigated experimentally. However, the research data collected from various research centers seems to fall into a pattern of increased growth rate from the use of tranquilizers under rather specific conditions.

For example, it appears there may be a response from some tranquilizers (there are numerous ones), whereas others may not give a growth response. Also, the amount necessary for stimulation may well fall within quite narrow limits.

How Do Tranquilizers Work?

The method by which tranquilizers might stimulate growth rate in beef cattle has not been identified. At this date, it is doubtful whether tranquilizers would exert a growth-stimulating effect through any degree of sedation because under experimental conditions, the level actually received by an animal in a day was much lower than that required for sedation.

Furthermore, research workers have reported that tranquilizer-fed cattle (at growth-stimulating levels) are just as active as those not fed a tranquilizer.—*Prof. T. W. Perry, Purdue University.*

What is Tapazole?

It is a synthetic chemical which exerts a strong "blocking action" upon the activity of the thyroid gland in animals.

The pharmaceutical name is Methimazole and in the pure state looks like many common white powders. The material is being used now in tablet form in human medicine for patients afflicted with oversecretion of the thyroid gland.

Total military expenditures runs some $13,000 per service man per year, not counting aid to our allies.

Why is Tapazole Used in Rations?

It was fed at various levels to cattle being finished in the feed lot to determine if this blocking action on the thyroid gland would bring about greater fattening and improved carcass quality.

How Used in Feed-Lot Rations

Since its usage is prohibited by

state and federal authorities, because of its newness, Tapazole is still in the experimental stage. However, when treated as a feed additive in feeding trials at Iowa State College, Tapazole increased daily gains as much as 21%.

When combined with 10 milligrams of stilbestrol per day, Tapazole increased daily gains 28% and feed efficiency 17%. Stilbestrol plus 600 milligrams of Tapazole boosted average daily gains of 2-year-old steers to 3.87 pounds during the first 56 days. The control lot receiving a full feed of corn, limited hay, and supplement containing stilbestrol but no Tapazole, averaged 3 pounds of daily gain per steer.

The cattle were sold on grade and yield and the returns per steer above original cattle costs and all feed costs were figured. The returns from the Tapazole-fed cattle were $12.44 more than the control group. Because of the newness of this feed additive, its cost is not known.

In these initial experiments, Tapazole did not improve or reduce carcass quality. Generalization as to this and the ability of this compound to consistently stimulate live-weight gains and reduce feed requirements must be based on additional experiments. *—Dr. Wise Burroughs, Iowa State College.*

What is Dynafac?

Dynafac is a trade name for tetra alkylammonium stearate. This compound is often referred to as a chemobiotic. "Chemo" indicates a compound of known chemical composition, while "biotic" refers to life. More precisely, Dynafac is a chemical compound having antibiotic-like activity.

Animal fat is the basic constituent in the production of Dynafac. This compound is stable under a wide range of conditions. Pelleting and adverse weather conditions do not destroy its potency as a growth promotant.

Why Dynafac in Feed-Lot Rations?

The ultimate objective in cattle feeding is to compound rations that will produce maximum gains on the minimum amount of feed without lowering the quality of beef. The use of well-balanced rations is often sacrificed in the

Chemical brush control is dealt with extensively in three leaflets published by the Texas Agricultural Extension Service. They are L-413, "Brush Control with Ammate," L-414, "Brush Control with 2,4,5-T," and L-415, "Chemical Brush Control, Broadcast Application." They are available from the Agricultural Information Office, College Station, Texas.

belief that a particular feed additive reduces the nutrient requirement.

Balanced rations are most important to feed-lot operations, just as they always have been. Dynafac, or any other growth promotant, supplements a well-balanced ration rather than replacing any of its component parts.

Various experiments using Dynafac have been conducted. Some of these experiments have shown Dynafac is beneficial for cattle in the feed lot. As with most feed additives, there is some variation in response, apparently due to differences in health of herds, type of ration, amount of stress, and genetic constitution of the animal.

How Does Dynafac Work?

The mode of action is the $64.000 question. The chemistry of Dynafac is well known but the means by which it exerts effect in the complex digestive tract of the cow is not fully understood. Apparently Dynafac exerts its greatest influence in the control of certain subclinical diseases. It is capable of controlling fungi and certain gram-positive and gram-negative bacteria.—*Prof. I. A. Dyer, State College of Washington.*

Tractor of the Future

Reading University in England is working on a prototype tractor with a number of new features. These include:

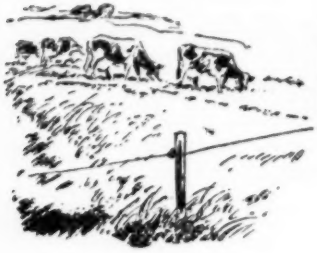
Power units behind the tractor driver to give an unrestricted view; air-cooled engines with horizontally opposed cylinders to give a longer life and smoother running; larger scale front-mounted implements; hydraulically driven p.t.o. to maintain a standard speed independent of engine ground speed. These were some of the future possibilities visualized by Mr. K. E. Morgan of Reading University.

The tendency, he said, had been to increase horse power and to reduce the cost per h.p. While he recognized that this was necessary, he felt that many facets of tractor development were not necessarily on the right lines. A prototype tractor was being developed, with these features, at Reading.

Speaking on tractor maintenance, Mr. W. J. Nolan, of Shell-Mex, emphasized three main points—the use of anti-freeze, care of the engine when not in use and the maintenance of clean fuel.

—Farmer and Stock Breeder

You Can Have More Pasture This Year



Complete renovation may be more lasting but fertilizer will put new life into old sod, help double your range and pasture next summer . . .

Condensed from
Massey-Ferguson Farm Profit

IF you want more pasture this coming year, grow it with fertilizer. A timely application will help you produce twice as many pounds of beef or milk.

You can pay for your fertilizer in a single season and have a nice profit besides.

Pastures are all too often the most neglected crop on the farm. On many farms they have been turning out beef and milk year after year for an entire century or more without the aid of a single pound of fertilizer! The reserve of nutrients now is exhausted and these pastures make tremendous response to a little nitrogen and other elements.

Fifteen Minnesota dairymen boosted bluegrass yields 2½ times by proper fertilization and management in 1957. Average increase in milk income above the $27 fertilizer cost was $80 per acre.

Fertilized pastures were ready to graze 2 weeks earlier in the spring and lasted 2 weeks longer in the fall than unfertilized sections.

Cooperating with Minnesota Extension Specialists Chas. Simkins and Ermond Hartmans, the dairymen applied 50 lbs of actual nitrogen per acre and put on phosphate and potash according to soil test. After each grazing they added another 30 to 50 lbs. of nitrogen.

Average season's application was 150 lbs. of N, 28 lbs. of P and 60 lbs. of K. Average milk return was 5,891 lbs. from fertilized pastures, only 2,321 lbs. from unfertilized areas.

"Good management is important in getting the most profit from fertilized pastures," emphasizes Simkins. "The best cooperators got back more than 8,000 lbs. of milk per acre, or about $65 more return than the aver-

Reprinted by permission from Massey-Ferguson Farm Profit, Milwaukee 3, Wisconsin

age. They gave cows only the pasture area they could clean up in one day, clipped any undergrazed grass and spread the droppings with a drag."

Arnold Zenke of Winona County, Minnesota, fenced off two-thirds of a 6-acre "wornout" hillside and applied 130 lbs. nitrogen, 72 lbs. phosphate and 92 lbs. potash per acre during the season. The fertilized portion produced nearly twice as much grazing area and returned an extra $60 for $31.50 in fertilizer. "Growth was amazing—my 18 Holstein cows just couldn't keep up," says Zenke. "Several times I had to mow off the surplus grass."

"I'm convinced there are millions of acres of pasture land in the Midwest where application of nitrogen will be highly profitable," declares C. J. Chapman, University of Wisconsin pasture specialist. "Our farmers have been astounded to see the tremendous response of pasture grasses to 10-10-10 or 12-12-12 fertilizer. Applied at rates up to 500 or 600 pounds per acre, yields have been doubled and sometimes tripled."

Prof. Chapman points out that 10-10-10 not only furnishes lush, early growth but it also extends the pasture season into late July. This grass is more palatable and is richer in protein and minerals as well as vitamins. That's why milk yields make spectacular increases.

In the East, New England's Green Pasture winners consistently turn out to be the men who keep grass production high with fertilizer.

George Merrill, Plainfield, Connecticut, spreads 500 lbs. of 8-16-16 per acre each spring. This pushes grass along for high spring yield. Later in the year he puts on more fertilizer to keep the grass producing during hot weather.

Down in the South you can write your own ticket for increased production. The Louisiana station found that 60 lbs. of nitrogen consistently produced an extra 2,000 lbs. of milk. All over the South farmers are finding that a relatively small investment in fertilizer can jump beef yields from 125 to the 250 lb. level.

One of our biggest problems these days is working out solutions for the solutions the last generation worked out.

Coastal Bermuda, the best permanent grass in the area, produced 300 lbs. of beef with 50 lbs. of N in Georgia; 480 lbs. with 100 lbs. of N; and 680 lbs. with 200 lbs. of N.

"When anyone thinks about

using 500 to 800 lbs. of a good mixed fertilizer on Coastal in the spring and then adds another 200 lbs. of N during the growing season, he is planning on a high producing grass and high production," declares W. R. Thompson, Mississippi's pasture man.

"We are going to have to start feeling about other grasses as we do Coastal. The other grasses may not make quite as much response as Coastal does but farmers still can get a $3 to $9 response for every dollar they spend."

All Western ranges are short on nitrogen. The use of nitrogen phosphate combinations such as 20-10-0 or 20-20-0 at rates of 200 to 400 lbs. per acre are real money makers.

California has taken the lead in fertilizing Western range. In Santa Clara county where it takes 2½ acres to make 100 lbs. of gain on native pasture, fertilized range will do the job on .8 of an acre.

On Sunland Ranch near Fresno last year, 80 lbs. of N produced 90 lbs. of beef per acre between January and May. Unfertilized range made only 48 lbs. Gain on fertilized grass was just over 2 lbs. per day.

These examples from coast-to-coast show what can be done. Complete renovation may be more lasting but fertilizer now means more pasture next summer and your money back by next September—perhaps sooner.

Coming in Space Age Agriculture

A farm "combine" which will package farm products as it harvests them was one of the future wonders of farming foretold recently by Charles G. Scruggs, associate editor of *Progressive Farmer.*

Among other developments predicted for the next 20 years were:

- Piping de-salted sea water for irrigation of inland farms, using old oil and gas lines—and possibly atomic energy for pumping power.
- Atomic irradiation of plants to speed up creation of new and useful varieties.
- Insertion of small organisms into the stomachs of farm animals to enable them to digest cellulose — a la termites.
- Ability to control prenatally the sex of farm animals.
- Weather control to increase rain, suppress frosts, stop hail, etc.

—Advertising Age

Pacemaker Hog Program

Now, University of Wisconsin experts write individual prescriptions to help farmers produce U.S. No. 1's in 180 days or less . . .

Condensed from Breeder's Gazette

THE Pacemaker Corn program has been so successful for Wisconsin farmers that they are now going in for the Pacemaker Pork Production Program. Their college writes the prescription, farmers sign up and agree to keep records, and away they go. This is their way to become more efficient through integration, multiple farrowing, contract buying and production evaluation.

Two achievement goals are set up for market hog producers: (1) Average litter weight for the entire herd must be 1,500 lbs. at 5 months of age. (2) Fifty per cent of all hogs must grade U.S. No. 1 at market weight (approximately 200 lbs.). We asked Prof. Fred Giesler for his prescription, and here are some points that you may want to check:

Breed from well-grown healthy gilts and meat-type boars. Use gilts that are at least 8 months old or mature sows. Separate your replacement gilts from market hogs at 125 lbs.

A clean herd test for Brucellosis and Leptospirosis is better than an individual test. However, a test of an individual animal is the minimum requirement for purchasing it.

Practice preventative vaccination against Hog Cholera if this disease has been a problem in your area . . . If Erysipelas has been a problem on your farm, start a preventative vaccination program.

Feed well balanced rations: (a) Abundant legume pasture; one acre will supply feed for 20-25 pigs weaning to market age. (b) In winter and in dry lot, use ground leafy legume hay in rations.

Save on Protein as They Grow

For pigs from birth to 40 lbs. use 20% protein ration; 40-75 lbs., 16%; 75-125 lbs., 14%, and 125-225 lbs., only 12%. Use a mixture of animal and plant protein in your supplement.

Each pig will eat about 10 lbs. of starter and creep ration be-

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fore weaning. The main advantages of creep feeding are a greater return per feed unit, healthier and thriftier pigs, and earlier marketing.

A starter is a well fortified feed and is generally not suited to home mixing. It should be used for 3 to 4 weeks and then followed with a less complicated creep feed. Many good starters and creep feeds are available.

The Creep and the Crate

Start baby pigs at 2-4 weeks on a creep ration like this: 40 lbs. Ground corn, 35 lbs. Oat groats (hulled oats) ground, 10 lbs. Dried skimmilk, 5 lbs. Meat scraps, 5 lbs. Soybean oil meal, 4 lbs. Alfalfa (leaf) meal, and 0.5 lbs. Trace mineralized salt. Use antibiotic supplement at recommended levels, for example: Aureomycin or Terramycin at 40 grams per ton of feed.

You will have provided clean, dry comfortable shelter and plenty of fresh water. Farrowing temperature should be 50-60° and will require artificial heat during the winter. Suspend 125-watt heat lamp 24″ from floor. For farrowing pen about 50 sq. ft. of floor space; long, narrow, 5' x 10' pens are most satisfactory.

For gilts the farrowing stall width is 20″; for sow, 24″. Seven feet long will accommodate both gilts and sows. Crate should be 10 to 12″ from the floor, and guard rails — 8″ above bedding and 8″ from the wall.

Bed pens lightly with chopped or short bedding. Provide one automatic watering cup for each 4 sows and their litters. Provide one automatic watering cup for each 20 market hogs. Provide watering cup or self waterer for pigs in creep feeding area. Provide one self-feeder hole for each 3 or 4 market hogs.

Use self feeder for sows and creep feeder for litter until weaning. Provide one self-feeder hole for each 2 to 3 sows. Provide 8 sq. ft. of shade area per hog when natural shade is not available.

Some people are so busy learning the tricks of the trade that they don't learn the trade.

For mange, BHC, chlordane and lindane are recommended. Treating herd 2 weeks before breeding season, young pigs at weaning time.

When Is She Due to Farrow?

Worm your sow herd 3 weeks before breeding and pigs every 50 days until 5 months of age with Piperazine. Another good treatment for young pigs is the continuous use of Hygromycin. Allow at least one week to clean and disinfect house between farrowings. Use a hot lye water solution—one can of lye per 8

gallons of water.

Wash sow with warm water and soap before penning her. Pen sow at 110 days of pregnancy. Be with her at farrowing time. Keep new-born pigs warm, hog house 50 to 60° and pig brooder temperature 90 to 100°.

Clip naval cord to about 2 inches in length and soak cord in tincture of iodine. When necessary, adjust size of litter to functional teats of sow.

Clip points of needle teeth on upper and lower jaw. Avoid clipping teeth too close to gum line. Ear notch pigs first day after farrowing. Prevent anemia by using an accepted treatment at 2 to 4 days of age, such as injectible iron, copper-iron paste, or iron pills.

Don't group sows before pigs are 2 weeks old, then never more than 4 in a group. The age of the pigs should not vary more than one week within each group.

To prevent Parakeratosis, supplement the ration with 100 parts per million of zinc. This is equivalent to ½ lb. of zinc carbonate or 1 lb. of zinc sulphate per ton of complete feed.

Sort out hogs when weighing 200 to 220 pounds and send to market.

If You Don't Like Liquid, Try Granular Herbicides

Granular weed killers may be the answer to objections farmers have to chemical herbicides. University of Minnesota experiments last summer showed that Simazin and Randox in granular form can give good weed control in corn—although not quite as good as the same chemicals in sprays. Granular herbicides are new. Up to now, practically all anti-weed chemicals have been used as sprays, in liquid form.

If granular materials continue to prove out well, farmers may like them better than sprays. Here's why: Randox and Simazin—both rather new chemicals—are far better for weed control in corn than anything seen up to now. Yet many farmers don't like using them. Randox in liquid form is so toxic you need to wear rubber gloves, goggles, and snug-fitting clothing when using it. Simazin comes only in "wettable powder" form, to be mixed with water. The carrier in such a powder can ruin many sprayers in short order. Granular weed killers get around most of these objections.

—University of Minnesota

How's Your Plant Population?

Here's a late report on corn, soybean and cotton research. Learn what factors limit crop yields . . .

Condensed from The Young Farmer

Wm. Fike, University of Minnesota

ARE there enough plants growing in your fields to give you the highest yields? You might think so, but plant populations per acre being used are often not the ones that give the best yield.

At present, corn, cotton, and soybeans are either drilled or checked in rows ranging from about 36 to 42 inches in width. What about narrower rows for higher populations of corn and soybeans? — wide corn rows for establishing legumes and grasses? —skip-row plantings of cotton? These new practices are being studied to give you the best return possible from your farm.

What's New in Corn Production?

Recent trends in research have gone in opposite directions. Narrow rows are being planted for higher populations. Wider rows are planted with the same or lower populations so that they can be interseeded with legumes or legume-grass mixtures.

A new innovation which should fit into both of these practices has been the development of dwarf corn hybrids.

Individual plants of dwarf corn have about the same number of nodes and leaves. However, the internodes below the ear are much shorter than those of normal corn. Because of this, the dwarf plants now being tested are approximately one-third to two-thirds as tall as normal corn. Trials in Illinois have shown a wide variation with the dwarfs ranging from 10% more yield than the normals on soils of low fertility to 20% below the normal fertility soils. *Stalk breakage in dwarfs is much less than in normal corn which is a main advantage of the dwarf hybrids.* The small size of the plants and the high resistance to breakage are an efficient aid in harvesting with corn combines. A number of the better experimental dwarf hybrids may be available in the near future for the farmer's use.

Research shows stands of field corn producing ears with air-dry

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average weights of 0.6 of a pound may be expected to give the best yields. Compare this year's field with next year's in fertility, texture, and structure. About 2000 plants per acre should be added to next year's field for each tenth of a pound your average ear is over the desired average weight of 0.6 of a pound. Decrease the population by 2000 plants per acre for each tenth of a pound your average ear is under the 0.6 of a pound average. An increase in fertilizer will also allow for an increase in plant population.

In northern Minnesota yield trials, as the population increased to 28,000 plants per acre, yields also increased. Yields tended to decrease in populations over this number. At the higher populations, corn in these tests did better when spaced in 20-inch rows than when spaced in normal 40-inch rows.

Corn as a Companion Crop

Each year many millions of acres are seeded alone and with companion crops for the establishment of pastures and haylands. One of the companion crops most widely used at present is oats. However, due to low grain yields and small monetary returns, a substitute crop would be welcomed by farmers. One of the more widely grown crops is corn. Corn as a companion crop would give the high monetary or feed return during the seeding year that the farmer wants.

To obtain good stands of an interseeded forage crop such as alfalfa, alfalfa - bromegrass, or sweetclover, the corn row width must be increased to 60 or 80 inches. These wider row widths are easier to plant and give the forage seedings a better chance to become established. Better stands of the interseeded crop can be expected in the 80-inch rows. Under favorable moisture conditions a good stand can also be expected in 60-inch rows. The use of dwarf corn in the 60-inch rows may prove to be as good for the establishment of interseedings as in normal corn in the 80-inch rows.

Two small boys trying to awaken their dad got no response to their questions. Finally one boy lifted an eyelid, peered at it and said: "I don't know why he doesn't answer. He's in there."

Here again plant populations enter the scene. As the row widths are increased, the plants within the row are placed closer together to compensate for the increased row width.

As one can see, arriving at the desired population in wider rows is difficult because of the close spacings of seed. Plants in

wide rows will yield well down to a minimum of approximately 4 inches between in-the-row plants. Below 4 inches, numerous barren and spindly plants begin to show up. Yield tests back this up. The maximum yield was obtained at the 20,000 population rate in the 80-inch rows at an in-the-row spacing of 4".

In the 40" and 60" row widths where the in-the-row spacing was more than 4 inches, acre yield was still on the increase at the 24,000 plant per acre population. In overall yield trials, wider row spacings resulted in only a 5-15% reduction in acre yield compared to normal 40-inch row widths.

There are some tremendous blessings in this beautiful land of America. One of the most pleasing is that we are not getting all the government we are paying for.

As in all cropping practices, the control of weeds in the wider corn rows is very important. They add to the competition already coming from the forage interseeding. A pre-emergence spray banded over the corn row does a good job of limiting the weed competition within the corn row. To avoid a decreased corn yield caused by competition from the forage crop, the interseeding should be made after the first cultivation of corn. It can also be made when the corn is from 2 to 3 feet tall. This cultivation will help to eliminate the weeds in the interseeding. If a grass is not part of the interseeding, a grass-killing herbicide could be used to control the weeds. If a grass is included, the use of a rotary mower may be needed to keep down competition to the corn.

An adapted cultipacker seeder or a grain drill with a disc assembly removed, can be used for interseeding the forage. Seeded in this manner, alfalfa, alfalfa-bromegrass, and sweet clover have given equal or slightly less returns as compared to those stands established in oats.

Interseedings in wide-row corn depend on moisture during their germination and growth mainly during the months of July and August. Moisture is therefore a more critical factor for interseeding than it is for the corn.

Morris Titterud and Allen Sorteberg, two Anoka county Minnesota farmers, tried seeding alfalfa between wide corn rows last year. They have better legume stands as a result. Titterud, a member of the Board of Supervisors for the Anoka Soil Conservation district, figured the practice might help avoid wind erosion. Ordinarily, many farmers in this area seed legumes in midsummer with no companion crop

at all. While this can give good stands, it means leaving the field without cover—and exposed to blowing winds — during several weeks of hot, dry weather.

When he planted his corn, Titterud used only one side of the planter, so the rows were 80 inches apart. He hitched the planter so it put the corn seed in the track of the tractor's front wheels. He plants on undisked soil.

He rented a 72-inch packer-type seeder, specifically designed for interseeding and seeded the alfalfa in early August. "It all certainly turned out well," he says. "Although wide rows meant lower-then-normal corn yields, I still got more use of the land than I would have by leaving it idle half the summer. Also—and this is especially important—the field was constantly protected from blowing. Finally, I believe I really have a better 'catch' this way than I used to get by seeding the conventional way."

Like Titterud, Sorteberg says one of the big advantages of interseeding is in controlling wind erosion. On six acres, he spaced the corn rows 84 inches apart, and seeded the alfalfa July 10 with the same seeder Titterud used. At this time, Sorteberg's corn was still short enough so that he could straddle one corn row with the tractor. He offset the hitch enough so that the seeder ran between the rows.

Next to the field Sorteberg "interseeded" is another he seeded the old way, with no companion crop. The difference is striking. "Where I seeded between the corn rows, there's a much better stand," he says. "One reason is that by interseeding I sowed the alfalfa after thoroughly cultivating. That means there is less quackgrass in the "interseeded" field.

Like Titterud, Sorteberg had a lower corn yield per acre than where corn is spaced only 40 inches apart, but this is to be expected. Interseeding still gives a much higher return per acre than would oats or no companion crop.

The temperature in Arabia often soars to 165 and 170 degrees in the daytime; and drops to below freezing at night.

Interseeding has some problems, Sorteberg aind Titterud point out. One is that there are bare strips in the alfalfa fields this spring where the corn rows were last year. A second is that equipment for seeding this way is rather expensive. Third, unless the corn stalks are treated after the corn is harvested, they become a problem when the hay is cut. Sorteberg is getting around this by pasturing the field. Tit-

terud flattened the stalks with a heavy field roller.

Soybean Production

Soybean production has increased greatly in the United States, from 77,374 million bushels in 1940 to an estimated 535,887 million bushels in 1958. Average yield has increased from 16 bushels per acre in 1940 to the present 23 bushels per acre average.

Soybeans are primarily planted in 36 to 42-inch row widths since the same equipment is often used as in the planting of corn and cotton. One plant should be dropped per inch of row. If one is skipped, the plant is able to branch-out sufficiently to compensate for it. The one-inch in-the-row spacing gives the best growth. *The only way to increase soybean plant population is by going to narrow row widths.*

Alfalfa rates at the top as the best hay to feed ewes with lambs. In Illinois, scientists are testing alfalfa, Korean lespedeza, mixed clover and Sericea hay. The Korean lespedeza and mixed clover are running a close second to the alfalfa, but the Sericea is far behind.

Under Minnesota conditions, an increase in yield of 7 bushels per acre was obtained by planting in 24-inch rows instead of 42-inch rows. Highest yields were obtained in the 18 to 24-inch row widths. Intermediate yields came from the intermediate row widths of 30 to 36 inches. The lowest yields were found in the so-called normal row widths of 38 to 42 inches.

The variety grown has much to do with yield increase in the narrow rows. Early varieties of soybeans have smaller growth habits. When planted in narrow row widths of 18 to 24 inches they will give an increased yield over those planted in the normal row widths. Later maturing varieties with their rank growth tend to yield about the same in the 18 to 24" row spacings as they do in the normal row widths. However, an increase in yield is obtained in the intermediate row widths of 30 to 36 inches. Best results are found when the rows are close together. At the time the plants are fully grown, the space between the rows will then be covered. Yet, no competition will be taking place between the plants of the adjoining rows.

Plant your rows as close together as you can effectively control weeds with the equipment available. Weed control is a must in narrow rows. Competition from weeds will keep down the higher yields you obtain by increasing the soybean population.

What's New In Cotton Production

Cotton is generally planted in rows averaging 40 inches in

width. It had been the general practice to plant cotton thickly and then thin by hoe or with mechanical choppers. Now it's common practice to use delinted cotton seed. This makes it possible to arrive at a desired spaced planting by selected drilling or by hill dropping. These methods save seed and also eliminate the need for thinning.

In cotton production, higher plant populations result from closer spacings in the row. There is a competitive effect between plants when they are spaced close together. This closeness causes a decrease in the height of the plant, fewer vegetative branches, smaller boll size, and even slightly less yield under drought conditions.

As summarized by the USDA, a greater plant population does increase the height of the first boll above ground and the number of bolls per row. There is a greater shading effect on grass and weeds, especially during the middle and late season. Machine picking and stripper harvesting efficiency are improved. Yield up to a certain point is increased, particularly in northern and irrigated areas. However, leaf trash in machine harvested cotton is more prevalent and there is a difficulty of coverage when defoliating.

In recent experiments, there seem to be a wide range of population rates from 20,000 to 60,000 plants per acre which have no effect on yield, but do have an effect on harvesting efficiency. In areas where cotton is grown for mechanical picking, plant populations of 20,000 (8-inch uniform seeding) or 26,000 (two plants at random per foot) in general give satisfactory results. Higher populations are recommended in areas where stripper harvesters are used and the growing season is short.

Skip-Row Planting

A new method of regulating plant populations in cotton growing areas has been skip-row plantings. Skip-row planting alternates a particular number of cotton rows with 4 skipped or fallowed rows. The most common method is 4 rows planted and 4 rows skipped.

The stomach of a 40 pound dog will hold 3 times as much food as the stomach of a 160 pound human.

Mississippi reported a 73% yield increase in the skip-row plantings over solid plantings. This increase came in the dry year of 1956. In the Mississippi tests, the outside border rows produced 3,700 pounds of seed cotton per acre, or approximately 130% more than solid plantings. The two inside rows of the 4-row plots produced 1,884

pounds of seed per acre—268 pounds over the 1,616 pounds produced on the solid plantings. Such large increases in yield over conventional row spacing should not be expected in a year with plentiful rainfall, although some increases should be expected in any season.

Arizona reports yield increases of from 10 to 40% using skip-row plantings with a closer in-the-row plant spacing yielding the highest. When interplanting soybeans in the 4-row fallow strips, there was no increase in yields of the skip-row over the solid planted cotton. Interplanted crops, which are actually growing the same time as cotton, appear to offer as much competition as other rows of cotton.

Other possible advantages of skip-row planting are better control of weeds and eradication of Johnson grass. Disadvantages are increased cost of land preparation, maintenance of fallows, and the application of insecticides as control by airplane would not be economical. In irrigated areas, cost of water would also increase.

Inches between plants in the row at 40, 60, and 80-inch row widths and at varying populations

Plants Per Acre	10,000	12,000	16,000	20,000	24,000
Row Width in Inches					
40″	15.6″	13.1″	9.8″	7.8″	6.5″
60″	10.5″	8.7″	6.5″	5.3″	4.4″
80″	7.8″	6.5″	4.9″	3.9″	3.3″

Some Good Rules

In striving to obtain high yielding crops of good quality, you, as a farmer have as your partner, "Mother Nature." She to say the least, isn't always cooperative and at best is totally unpredictable. As you share in quality crop production, you can observe these "old reliable" cropping practices:

Follow a good rotation using a proper crop sequence.

Fertilize adequately to meet the demands of the crop to be grown.

Prepare a good seedbed.

Choose a variety recommended for your own locality.

Plant at the proper time.

Observe good planting practices and adjust plant population to give the best yield.

Practice good weed and insect control measures during the growing season.

By following these practices and with adequate rainfall, good temperatures and without adverse conditions as wind, hail, and storm, you can expect a bumper crop come harvest time.

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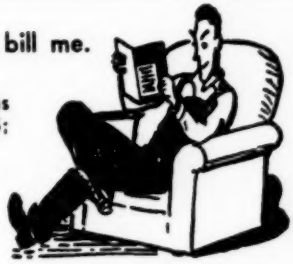


Here's a sketch of our farm where we publish Farmer's Digest. Our 200-acres are planted to corn, alfalfa, grass and trees. We farm — and we publish our magazine on a farm — because we believe that's the only way we can know what other farmers want to read. Farmer's Digest is probably the only farm magazine in the world published on the farm by farmers.

FUN ON THE FARM

A Collection of Jokes and Humorous Farm Stories

A small farm boy, waiting in the beauty shop for his mother's hair to dry, walked impatiently over to her and said, "How much longer will you have to be under the brooder?"

★ ★ ★

One afternoon a stranger came into the milking parlor where I was working. He asked if we could take him on for evening and week-end milking. The farm manager was out, so I asked him if he could milk.

"Done a lot as a boy, you know," he assured me.

"During your milking work, have you ever had trouble with mastitis?" I questioned further.

"No, sir," he said, "but I get rotten colds."

★ ★ ★

A lawyer was attending a funeral of a farmer friend. Another friend arrived late and took a seat beside him, whispering, "How far has the service gone?"

The lawyer nodded toward the clergyman in the pulpit, and said: "He's just opened for the defense."

An FHA administrator in a Wisconsin town has been subjected to quips since he moved his office to the basement of a large hotel. A sign in front reads, "Farm Home Administration Downstairs. Watch Your Step."

★ ★ ★

The farmer gazed thoughtfully at the insurance policy which the agent has just presented to him.

"Now that I've taken out this insurance," he said "what would I get if my house should burn down tonight?"

"Oh," was the agent's quick reply, "I'd say about ten years."

★ ★ ★

Riding together on a slow train, a farmer and a professor soon tired of conversation.

"Let's have a game of riddles," said the professor. "If I have a riddle you can't guess, you give me one dollar and vice versa."

"All right," replied the farmer, "but you're better educated than I am, do you mind if I only give 50 cents?"

"Okay," replied the professor, "you go first."

"Well, what animal has three

legs walking and two legs flying?"

"I don't know. Here's a dollar. What's the answer?"

"I don't know either. Here's your 50 cents," answered the farmer.

★ ★ ★

The best way to have a vegetable garden cheap is to cultivate the owner.

★ ★ ★

A veterinarian telling a farmer how to administer medicine to a horse, said: "Simply place this powder in a metal pipe about two feet long, put one end of the pipe well back in the horse's mouth and blow the powder down his throat."

Soon afterwards the farmer came running into the vet's office in a very distressed condition. His clothes were covered with powder and his face was a sickly color.

"What's the matter?" asked the vet.

"I'm dying!" sputtered the farmer hoarsely. "The horse blew first."

The biggest difference between a farmer and a gentleman farmer is that the latter is spared the harrowing details.

★ ★ ★

A husband is a man who wishes he had as much fun when he was out as his wife thinks he does.

★ ★ ★

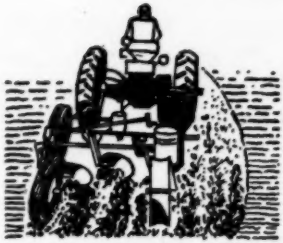
When a farm mother found her infant daughter eating handfuls of sand, she was frantic. She rushed the child into the house, made her drink lots of water, then phoned the doctor.

After explaining what had happened and what she had done, she asked the doctor what she should do next.

"Just don't give her any cement," the doctor admonished.

Get Well With Meat — Good nutrition is particularly important to the recovery of the person who has been ill or undergone surgery. Because meat supplies protein, iron and essential B vitamins, it is helpful in restoring blood losses and repairing damaged body tissue and healing wounds.

How Minimum Tillage Pays



You save gasoline and tillage costs, get bigger yields . . .

Condensed from Prairie Farmer

Keats Vining

MINIMUM tillage can be defined as the least amount of tillage needed for quick seed germination and a good crop stand. It can be done with plow, field cultivator, disk, and herbicides. It means less cost, with increased yields and quality of crops.

Each year sees more farmers plowing and planting corn in one operation.

A prominent Michigan potato grower figures that 90 per cent of the growers in the state are plowing and planting potatoes on the furrow, and at least 80 per cent of the sugarbeet growers last year were using minimum tillage methods.

Oats, wheat, soybeans, and muck crops can also be added to the list of crops that can use some form of minimum tillage.

It is saving farmers money.

Soils packed by tractor and tillage implements before planting cost money. Basing figures on conservative custom rates, farmers save about $3 to $6 an acre in just their costs of preparing soils. This for just doing less work and burning less gasoline.

Tillage accounts for about one-third of corn production costs. Any practice that reduces this cost should mean money in the farmer's pocket and more efficient corn production.

Plowing, planting, fertilizing, and applying a herbicide in one operation has been done with a machine developed in the agricultural engineering laboratory at Michigan State University.

This machine is a four-wheel, three-point-hitch tractor equipped with a three-bottom plow, a mounted corn planter, and facilities for side-dressing fertilizer. Herbicides are applied after the planting operation.

Many Successful Experiments

It has been used successfully on 10 different farms in six counties, on 10 different soil

Reprinted by permission from Prairie Farmer, 1230 Washington Blvd., Chicago 7, Illinois

types. It is also used on the university farm. Its use was checked on all farms with the conventional way of preparing soil for corn planting.

The average increase in 1957 was 11 bushels per acre for the plow-and-plant method over the conventional method. The machine was in use again this year.

Sugarbeet yields went up when growers stopped plowing, harrowing, disking, and thereby compacting their soils, and changed to a plow-and-plant program.

A Michigan beet grower plows his sugarbeet fields 11 inches deep, trails a spike harrow, and plants right away. He has averaged 23 tons of beets an acre over a five-year period. On the same farm, prior to 1934, his father was not satisfied until he had worked the beet land at least 10 times. His six-ton yields were not profitable so he quit growing beets.

A potato crop is generally preceded by a crop of rye. When this crop is about a foot high it is worked into the soil with a disk or a field cultivator. The field is then plowed and potatoes planted on the furrow. Here is a saving in tillage costs, and the potatoes are planted earlier.

Bean growers are beginning to use minimum tillage methods. One took a new step this past year. He planted yellow-eye beans in 12-inch rows and made a pre-emergence herbicide application. The narrow rows meant he couldn't cultivate, but the herbicide kept weeds down. With the closer rows the farmer was able to use a combine to better advantage in harvesting his crop.

Onions have always been sown in a 12-inch row. This means hand labor in cultivating and weeding, and hand labor is getting scarce.

Some growers have been widening their rows from 12 to 21 and 42 inches. Either width makes it possible to use a tractor for cultivating. This means less hand work and more acres covered in a day. To make up for the loss of onions, growers have been planting more seed per acre.

Today's farm worker produces food and fiber for himself and 23 other persons. Five years ago he produced for himself and 17 others.

Many acres of muck soils are growing corn. Wind erosion is a problem on these soils. Growers have found out that plowing and planting corn on the furrow leaves the surface rough and has decreased wind erosion.

Besides saving in field operations, minimum tillage has other advantages. One is erosion control. Water penetrates loose soil quickly and readily, thus reduc-

ing runoff and erosion. Purdue University reports that plow-plant methods reduce soil loss by 40 per cent. Such tillage leaves the soil in condition to absorb rainfall readily.

Loose soil is a better medium for organism activity. Organic matter decomposes and general soil formations occur faster in a well-aerated soil. Weeds start slowly because the surface is dry and seeds below the surface are buried too deep to germinate.

Minimum tillage isn't just concerned with plows and other tools. Herbicides are fast taking their places alongside of tillage tools.

Purdue University agronomists recommend broadcasting legume seeds on frozen wheat fields in late February or early March. Freezing and thawing will help work the seeds into the ground as well as fracture hard seeds, making better germination when growing weather arrives.

Controlling grasses, particularly quackgrass, has always been a trying job for a farmer.

Until recently there was only one way to control this pest, and that was to field cultivate it out of existence. This meant at least six, and perhaps more, trips over the field with a tractor, disk, or cultivator. Only then could a farmer safely plant corn, potatoes, beans, sugarbeets, or even grass seedings. Figure the cost of this operation, including time, gasoline, and farm labor.

Today that has changed. The use of herbicides such as 2,4-D ester, Pre-emergence, C M U, Dowpon, and Eptam have made it possible either to kill or control quackgrass. These materials vary in cost and amounts used per acre.

Dowpon has been used successfully in quackgrass control. A west Michigan potato grower applied six pounds per acre early in April 1957. In a week the quackgrass was drooping and showing effects of the herbicide. The field was plowed and planted to potatoes. It was hard to find any quackgrass in the field that year.

Jenkins Brothers, potato growers in Kalkaska county, Mich., used Dowpon on 100 acres of quackgrass this past year with success. Potatoes followed the quackgrass. They plan to treat a similar acreage next spring.

Dowpon will cost about $1.00 a pound, depending on the amount purchased. About six pounds per acre is an average application. This depends somewhat on the time of year. Compare a $6 cost per acre with the cost of running a tractor with

disk or field cultivator for quackgrass control.

Minimum tillage has paid in another way. It has been an incentive for the mechanically-minded farmer to develop new ways to use current farm tools or devise new ones. Several tractor attachments used in minimum tillage have come from a farm workshop.

A southwest Michigan farmer had his corn land plowed and intended to plant at once. Weather conditions prevented. When he could plant, the surface was dry and on the hard side. He attached a cultivator to the front of his tractor with the teeth set as deep as the corn would be planted.

With the cultivator stirring the soil ahead of the tractor, the corn was planted and grew a good crop. No reworking the field for that corn crop.

"The Porklet" is Tender, Juicy, and Nutritious

A delectable pork item, "the porklet," was introduced recently at the National Swine Industry Conference. The group accepted it with enthusiasm. An acceptance test also indicates that the porklet is well liked. It scored 8.2 out of a possible 9 points when rated by a consumer-type taste panel.

The porklet is derived from the pork Boston butt. Slices from the Boston butt are cubed by machine much as a steak is cubed. This process produces the porklet, which is about four inches square and weighs about four ounces uncooked.

Lean pork is very nutritious; it provides substantial amounts of protein, minerals, and vitamins, particularly thiamine (vitamin B^1). A three and one-half ounce serving of pork provides approximately 69 per cent of the recommended daily allowance of thiamine for the average man.

The mechanical processing, plus the initial tenderness, combine to produce a product which can be cooked quickly to the well-done stage. Griddle broiling is the recommended method of cooking. The browned porklet has a distinctive flavor. It can be served on a bun or as a regular meat serving.

If you would like to try a porklet, ask your meat market man to bone a Boston butt, slice it, and run it through a cubing machine.

—Clemson Agricultural College—

Bulls For Dairy-Bred Beef

Better beef from the dairy herd is told about in this article from England . . .

Condensed from Farmer and Stock Breeder

Dr. John Hammond, F.R.S.

DUAL-PURPOSE cows have always been popular to the livestock breeder, for not only have the cows supplied ready money from milk sales but the steer calves grow into money as beef. Unfortunately, however, not all so-called dual-purpose cows will give steers which will produce really good beef. The use of beef bulls on such cows, even in small herds, has been made more possible by artificial insemination.

Two main problems arise. First, to what extent can beef bulls be used on dairy cows and herd replacements for milk production still be maintained? Secondly, what is the best beef breed to use on the various breeds of dairy cows?

One-Third Beef

Concerning the first question, reports show that the use of beef bulls in dairy herds has been rapidly increasing.

If the worst milking cows in the herd are put to a beef bull and the best to a dairy bull, milk production can be maintained by better heifers in the next generation. All heifers can also be put to a beef bull, for the smaller beef cross calf gives an easier calving and so adds to milk yield.

The great danger at the moment is that too many young healthy cows may be culled from dairy herds and lower the number of dairy cows in the country.

The second question, what is the best breed of beef bull to put on the different breeds of dairy cattle, is difficult to answer because of the little factual evidence we have on the subject.

Before considering the different crosses it would be well to detail what the present-day requirements are for a beef animal.

Good weight-for-age is needed, for then food conversion is better. A young animal, 1½ to 2½ years old, of light weight, 9½ cwt. or under, is required to give a quick turnover and a high proportion of the best cuts. Such young animals give fine-grained meat which does not require

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over-fattening to make the meat tender.

Preliminary results in tests, not yet completed, at the Experimental Farms at High Mowthorpe and Rosemaund, England indicate that both the Aberdeen-Angus and Hereford bulls mated to Friesians or Dairy Shorthorn cows produce suitable beef.

Ready Earlier

When kept on similar feed all four beef crosses were ready for slaughter about a month earlier and graded better than the pure-bred dual-purpose steers. Carcass weights at just under 2½ years old were highest for the Friesian, about 800 lbs. with the Dairy Shorthorn, and the beef crosses weighed in the region of 730 lbs.

The Hereford crosses weighed rather more than the Angus crosses and the Friesian crosses rather more than the Shorthorn crosses.

These figures may, however, need modification when larger numbers have been obtained. It is quite evident, however, that these crosses give suitable beef.

Unfortunately there are very few facts at present available on Ayrshire crosses with the various beef breeds, although plenty of opinions have been expressed. In my opinion there are advantages and disadvantages in most of them. In Scotland they say the Beef Shorthorn makes the best cross, and there were some good examples shown at the Dairy Show this year. But in Scotland the Dairy Shorthorn is of little importance, while in England it is our most numerous dairy breed.

Too Like Shorthorns

Since the calves of the Beef Shorthorn - Ayrshire cross look very much like Dairy Shorthorns and so would be liable to get into dairy herds, should we not lose more in efficiency of milk production by making this cross than we should gain by any difference in beef qualities between the Beef Shorthorn and other beef breed crosses?

The Aberdeen - Angus crossed with the Ayrshire is inclined to be light in weight-for-age. Both breeds are fine boned and there is a risk of obtaining shelly animals as a result. From appearance the Hereford-Aryshire cross is better, as the stronger bone of the Hereford seems to add more substance to the crossbred.

Antibiotics in the laying mash at levels of 50 to 100 grams per ton have been found helpful when egg production is hurt because of certain disease stresses.

The main disadvantage with the Hereford-Ayrshire cross is that often it looks like a pure

Hereford with no blotches of red on the face, as is seen in the Hereford-Shorthorn cross.

This often detracts from the good name of the Hereford, since the crossbred calves do not develop as well afterwards as the pure breed would.

Galloway Cross

Few Galloway crosses on the Ayrshire have yet been made, but when the modern quick-maturing type of Galloway bull has been used they show promise. The stronger bone and good depth of flesh of the Galloway seem to correct these deficiencies in the Ayrshire and in addition,

Feeding legume silage may cut protein costs for the dairy herd. Trials indicate that cows fed legume silage produced as much milk on a corn-oats mixture as when a higher protein mixture was fed.

where the yearlings are to be wintered out, they grow a good coat.

The national necessity of getting some good beef out of Ayrshire cows in England would seem to warrant experiments in crossing with Charollais bulls. This French breed is strong in bone, deep in flesh, and has a very outcurved thigh, all of which are lacking in the Ayrshire.

Since Charollais calves weigh about 100 lbs. at birth, it might be thought that there would be difficulties with calving, but experiments at Cambridge some six years ago showed that in reciprocal crosses between different breeds, South Devons and Dexters, the small dam controls the size of the calf to one she can give birth to.

In the small dam, calf size is limited by nutrition, whereas in the large dam it is limited by the genetics of the sire. Crosses between breeds of different size, however, should at present be limited to adult cows. More experiments are yet required for heifers.

On Jersey Cows

Much the same thing is found in beefbred crosses on Channel Island cows. In New Zealand, experiments in crossing Beef Shorthorn, Hereford and Angus bulls with Jersey cows have caused no calving troubles to be reported. The carcasses of these crossbreds at just under two years old were sent to market. The weight and finish made strong appeal to the experts and the color was good.

The Hereford cross, with a carcass weight of 504 lbs. for steers and 411 lbs. for heifers, was considered best. The Angus cross, at 508 lbs. for steers and 457 lbs for heifers, was rather

too well finished, while the Shorthorn cross, which weighed 519 lbs. for steers and 487 lbs. for heifers, was slightly leggy.

It is evident from this experiment that it is quite possible to produce good saleable beef from beef-breed crosses on the Jersey.

Although the weight-for-age is rather less than would be expected from dual-purpose breeds there is a good demand for such light weight carcasses. If beef from the Jersey can be made in this way it can certainly be made from the Guernsey. More facts are wanted, however, from such crosses made in this country.

In addition to the question of which is the best breed of beef bull to use on the different breeds of dairy cows, the question of type of bull within the breed also needs consideration.

For crossing, is the compact but rather small type of bull demanded by the export trade better than the so-called crossing type of bull which is rather larger and coarser? In the past the latter has been used because of its lower cost, but if the former produces the better beef there seems no reason why the A.I. stations should not use them, for some 64 per cent of the beef consumed in this country is now home-produced.

Insect Control by Fertilizer Is Future Possibility

Nitrogen fertilizers may be used in the future to control some kinds of insects.

Several tests by soils specialists indicate that heavy nitrogen treatment in some cases makes plant foliage toxic or repellent to certain insects.

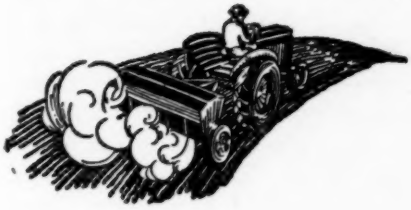
For instance, buckwheat fertilized with composted peat which had been acidified by addition of 4% nitric acid thrived in spite of heavy attacks of aphids. Buckwheat fertilized with untreated alkaline peat was attacked so badly it died.

In past research, it was found that red pine seedlings fertilized heavily with nitrogen fertilizers did not fall prey to the red pine sawfly larvae. Seedlings which didn't get nitrogen were completely defoliated by the insects.

The reason for lack of insect damage on fertilized plants isn't known. It may be due to an accumulation of ammonia or amino acids in the foliage. Further tests are necessary before the mode of action or practicality of such treatment can be definitely learned.

—University of Wisconsin

Lime to Save Potash



Save fertilizer dollars by using lime wisely . . .

Condensed from
Research and Farming

Grant W. Thomas and
N. T. Coleman

FARMERS are heavy users of potash. But crop plants do not get all of this fertilizer. A good part of it—up to 50 per cent in some soils—washes out in the drainage water before the plants can get it.

How can this waste of plant nutrients and fertilizer dollars be stopped?

A little lime helps a lot, according to experiments. There are two ways in which lime conserves potash.

Aluminum Ions In Control In Acid Soils

First, acid soils are saturated with aluminum ions which stick to the soil particles, neutralizing their negative changes. Aluminum ions have three positive charges and are bound tightly to the exchange spots in the soil. Potassium ions have only one plus charge and are not held very tightly.

Thus, when muriate of potash, a salt, is added to an acid soil, very little of it is able to kick aluminum off the exchange spots. Much of the potash stays in the soil water and can be washed out of the soil.

However, when lime is added to a soil, calcium and magnesium ions replace the aluminum ions on the exchange spots. These are not held much more strongly than potassium. Therefore more of the potash fertilizer can be bound by the soil particles, with less staying in solution to be washed out of the soil.

Liming Makes More Room

The second reason why liming saves potash is that liming raises the soil pH. In so doing, the number of exchange spots is increased. In other words, there are more places for potassium to stick in a limed soil than in an acid soil.

So with more spots available and each one easier to grab, it's no wonder that more potash stays in limed soils.

Reprinted from Research and Farming, Agricultural Experiment Station, North Carolina State College, Raleigh, North Carolina

Conservation of potash by liming can be very important in sandy soils but is less important on heavier soils. This is true because the heavier soils have larger exchange capacities or more spots to catch potassium.

Kinds of Potash React Differently

For the same reasons some sources of potash stay in the surface soil longer than muriate. For example, potassium metaphosphate has a basic reaction and makes its own exchange spots when it is added to acid soils. Sulfate of potash has behaved like muriate as far as potassium losses were concerned in all soils studied so far.

This work shows still another reason why lime is so important in a balanced agriculture. Not only is potash saved, but calcium and magnesium are supplied for plant use by liming. Really, then, you're killing three birds with one stone.

Winter Dysentery May Hit Dairy Cows

If milk cows knew about all the diseases that threaten them and their production records, they'd probably get ulcers in all four stomachs, according to a University of Illinois veterinarian. At this time of year, in addition to such ailments as mastitis, milk fever and possible abortion, dairy cows may also contract winter dysentery.

Stabled cattle are subject to a highly infectious dysentery from now until about March, says Dr. Boley, University of Illinois veterinarian. It's more likely to occur in heavy dairying areas, but any herd is susceptible. It seldom causes deaths, but milk flow may drop to half of normal. Infected cows may be severely dehydrated and slow to return to normal production. In severe diarrhea, vitamin depletion results and supplements to the feed are needed.

Signs usually appear throughout a herd within a few days after one or two cows show a watery diarrhea. Bacteria are believed to be the main cause, although a virus may be a contributing agent.

The disease may be rather severe in some animals, requiring special treatment by a veterinarian. To prevent and control winter dysentery, keep visitors out of feed alleys, and don't visit neighbors whose herds have dysentery. Reduce feed intake, increase laxative effect of feed by adding molasses to it and avoid abrupt changes in the ration. —*Illinois Extension*

New Sod Crops for Your Cornfield

For seeding between the corn rows, ryegrass and fescue have it all over grain-type rye, say these farmers. Here is how they do it . . .

Condensed from Farm Journal
Dick Braun

CORN growers are taking another look at cover crops—grasses that you seed between the rows to keep the ground covered, over winter, and to add valuable organic matter.

In fact, there's a cover crop boom going on now on many farms. But farmers aren't using the ordinary *grain-type rye* that can easily get out of hand and rob the corn of both moisture and plant food.

Instead, they're seeding *domestic ryegrass* and *fescue*. Some mix them together, others seed them singly.

These grasses have it all over rye, say farmers who've tried them. You can seed them early—right after July 4th—and they won't compete with the corn for moisture. Reason is that corn finishes growing before frost trims the leaves and lets enough light through for these grasses to make fast growth.

Ryegrass never grows more than 16 inches tall, doesn't take much spring moisture and its dense root growth mellows heavy soils.

What's more, that pad of roots keeps tractors out of the mud at corn picking time—and again during plowing the next spring.

On the other hand, grain-type rye makes lots of topgrowth and not much root growth. In the spring, it can "get away" before you're able to plow. The tall growth is sometimes hard to turn under and it saps the soil moisture which the upcoming corn crop could use.

The early July seeding date fits the corn plant. It's still short enough so you can *drill* the cover crop, if you remove the disks that straddle the corn rows. Some farmers mount a PTO-or battery-driven seeder on their tractor while they cultivate the last time.

Others make an extra trip over the field—open up the seeder to take six or eight rows at a clip.

If you seed in a separate operation, *seed immediately after*

Reprinted by permission from Farm Journal, Philadelphia 5, Pennsylvania

the last cultivation. Don't let the soil crust over. Dainty ryegrass seed waits for rain to cover it before germinating.

One of the ryegrass-fescue pioneers is Wilbur Kleck, Fulton County, Ohio. He seeded 300 acres of corn to domestic ryegrass-Kentucky 31 fescue last July.

A half-and-half mixture suits Kleck and his sons best. Total cost runs about $3 an acre for 20 pounds of seed. Ryegrass is a fast starter, but fescue is more winter hardy.

"In five years, the organic matter in our continuous corn fields with cover crops has nearly doubled—up from 2½% to 4%." says Kleck, whose soils are checked by Fulton Soil Conservation District technicians.

"A field in corn seven years straight still plows like new sod, has averaged 98 bushels an acre," he says.

Another Fulton County farmer, Robert Short, has tried several cover crops—rye, orchard grass, ryegrass, fescue, even the new field bromegrass. He found orchard grass skimpy on root growth, but seed is scarce. Ryegrass has performed best of all for Short, with Ky. 31 fescue second.

Max Shaul, the New York farmer who grew 205-bushel corn on three 2-acre fields last year, *and averaged* 150 *bushels on* 400 *acres, seeds* 12 pounds of ryegrass per acre to help keep down weeds.

Ryegrass can begin paying off the first fall. "We like to pick corn off grass rather than mud," says Kleck.

Besides keeping your soil in place, a cover crop stores plant nutrients against leaching, lets you plow sooner in a wet spring, builds up organic matter and improves soil tilth.

That's a pack of advantages from a crop that gets along in the space between your corn rows.

Guide Available on Slaughter Grades

A pocket-sized guide to grades of slaughter cattle has been prepared by Donald W. Acott, extension livestock marketing specialist at Colorado State University. The guide shows pictures, and gives descriptions, of various grades. "It should help you understand and remember the differences between the grades," he comments.

For a copy, write to Extension Service, Colorado State University, Fort Collins, and ask for the folder, called "A Guide to Grades of U. S. Standards for Slaughter Cattle."

Shall We "Correct" Fertilizer Formulas?

Soil tests read available phosphorus and potassium. Fertilizer formulas give these same elements as oxides. Now, one manufacturer brings the two together . . .

Condensed from Minnesota Farm Bureau Service Co. Indicator

Dr. C. O. Rost, Consulting Chemist

FOR a number of years soil scientists have been urging that plant food elements in fertilizer be expressed on the elemental basis. This change would bring a new look to fertilizer formulas. Old favorite 5-20-20, for instance, would become 5-9-17.

The nitrogen in a fertilizer formula would not be changed since it has been reported on the elemental basis for many years. Phosphorus as shown on present day fertilizer bags is actually phosphoric pentoxide P^2O^5. On the elemental basis, it would become Phosphorus (P).

Potassium now is actually potassium oxide K^2O. It would become Potassium (K).

There are good arguments for changing to elemental P and K. It is the percentages of these elements which are important since they're the real plant foods.

As a matter of fact there is no P^2O^5, or K^2O in fertilizer. The phosphorus exists as mono calcium phosphate, dicalcium phosphate, calcium meta phosphate or one of the ammonium phosphates. The potassium is in the form of potassium chloride or potassium sulfate.

Chemists have long expressed the analysis of substances as oxides as do present fertilizer formulas. One reason for this is that most metallic elements when exposed to air take oxygen from it to form oxides. With some elements such as phosphorus the reaction with oxygen is so violent that it bursts into flames. Elemental potassium reacts just as vigorously with water from the

Have your soil tested.

Reprinted by permission from Minnesota Farm Bureau Service Co. Indicator, Minnesota Farm Bureau Service Co., St. Paul 7, Minnesota

air or any other source to form lye. Nitrogen is an inert gas and makes up four-fifths of our atmosphere.

Thus we cannot put N, P and K as such into fertilizers. The elements must be made into chemical compounds which are stable and these compounds put together under suitable conditions and processes. That is the reason why we do not and cannot have fertilizers containing 100 per cent plant food.

Putting the fertilizer analysis on the elemental basis would not only give the actual percentage of the plant food elements, but would simplify the problem of fitting a soil test to a fertilizer ratio and grade. The modern soil test shows the pounds per acre of available P and K.

When all is said and done, there is generally more said than done.

When we express the fertilizer formula on the elemental basis, it would appear that it is being down-graded to a lower grade material. A 5-20-20 fertilizer as now manufactured would have a formula of 5-8.8-16.60. P_2O_5 contains 5 oxygen atoms and K_2O contains 1 oxygen for 2 potassiums. Oxygen has weight and consequently makes the percentages higher than either the actual P or K. Since P_2O_5 contains more oxygen than K_2O the reduction shows most on phosphorus. When a changeover to the elemental basis is made the fertilizer would be formulated to give .whole numbers. With a slight modification the 5-20-20 would become 5-9-17.

The Minnesota Farm Bureau Service Company has recently adopted the procedure of stating the analysis of their fertilizer in terms of both the oxides and the elements on the bags. Their 5-20-20 bag shows the following analysis:

Minimum Nitrogen (N)	5.0%
Available phosphoric acid (P_2O_5)	20.0%
As available phosphorus (P)	8.8%
Water soluble potash (K_2O)	20.0%
As water soluble potassium (K)	16.6%

This means that the present 5-20-20 becomes 5.0-8.8-16.6 on the elemental basis.

Fertilizer control officials are now asking the states to pass laws making it mandatory to show all fertilizer analysis on the elemental basis and it seems highly probable that many states will have such laws in the not far distant future.

Giving the fertilizer analysis in terms of percentages of plant food elements gives a truer picture of what is in the fertilizer bag.

Did Your Soil Sizzle?

The hot sun on unprotected soil can do a lot of damage . . .

Condensed from New Mexico Extension News

Clark Leedy, Soil Conservationist

DID YOU know that the temperature of a dark-colored, unprotected soil can reach 140 degrees Fahrenheit or higher?

Darker soils absorb the sun's radiation. Light-colored soils reflect radiation. Light soils will absorb about 30 per cent of the sun's radiation; dark soils can absorb 80 per cent or more.

The high temperatures are found only in the top inch of the soil, but they cause much damage to the soil, bacteria, organic matter, and vegetation.

Moisture is stolen from the soil by evaporation. Lack of moisture reduces plant growth. Seedlings may not germinate or may grow poorly. Research shows that the best seed growth occurs when the soil temperature is 65 to 80 degrees Fahrenheit. Temperature over 100 seriously impedes seed growth, and can stop germination.

Many of the useful soil bacteria are killed by high temperatures, and therefore organic matter breakdown is reduced. The ideal soil temperature for soil bacteria ranges from 75 to 95 degrees. Temperatures above 95 are harmful.

"Hot" soils can shed the sun's radiation in three ways. First is reflection of the sun's rays. A light-colored soil uses this method. Second, hot soils can convey the heat deeper into the profile thus causing more evaporation of precious soil moisture, and more plant harm. Dry soils heat up faster than wet soils because soil moisture slows heat conductivity. The third method is to convey the heat to the thin layer of air above the ground. The heat in this layer causes increased evaporation and plant transpiration.

Sitting and wishing won't improve your fate, the Lord provides the fish but you gotta dig the bait.

Reprinted from New Mexico Extension News, State College, New Mexico

To keep your soil cool, the logical step is to shade it. Shade can be provided by mulch or vegetation. A good cover of stubble on a field can keep the soil temperature up to 30 degrees cooler than the same field without stubble. A good cover of grass on well-managed rangeland can reduce soil temperature by as much as 28 degrees. A poor stand of grass on overgrazed rangeland will not provide much shade.

When land productivity decreases, the city resident is the first to tighten his belt.

Keeping the soil moist is a good way to keep it cool. If you irrigate, this is easy. If you have a dryland farm, the moisture caught and stored in winter and spring makes the difference.

Soil temperature can be controlled by using mulch, water, and common sense. Provide a good cover of mulch on bare fields. Wise range management keeps your grass healthy and vigorous. Irrigate to keep the soil moist, or catch the moisture and hold it. Remember, the cool soils are high yielding.

You Need More Coarse Lime

Limestone particles coarser than 20 mesh decompose very slowly. This means more of the material will be needed to "sweeten" soil than if the limestone particles are smaller. S. A. Barber, Purdue University agronomist, points out that some agricultural limestones have a high proportion of 20-mesh or coarser materials.

The standard used by Purdue is 40 per cent or more limestone through a 60-mesh screen. Limestone coarser than this can be used and is of value in correcting soil acidity, but a heavier application per acre will be needed, Barber explains.

Farmers can usually learn the fineness of limestones available in their localities from county extension offices, Soil Conservation offices, etc. Many limestone vendors and vocational agricultural teachers also have this information. —*Purdue University*

What Does It Cost To Raise Corn?

High yields are a "must" for profits. Check your yields, costs and profits against figures in this article.

Condensed from Plant Food Review

Paul R. Robbins

LOWER grain prices and higher production costs provide a real incentive for corn growers to take a long look at what it is costing them to grow this important crop and how much is left "after all the bills are paid."

Despite the cost-price squeeze, farmers who follow sound management practices are making a good net return per hour or per acre raising corn, provided they get high yields. Many corn growers are achieving a labor return of more than $5 per hour.

What yield does a farmer need to make to net $5 per hour on his labor? What is the break-even point? How much does it actually cost to raise an acre of corn? How much more does it cost to grow corn than soybeans, oats, wheat or other crops?

A recent survey reflecting the experience of 313 Indiana farmers helps to answer these and similar questions. Farmers included in the survey were "better-than-average" crop producers whose farms represented soils ranging in texture from sands to silty clay loams. Each farmer provided information on yields, fertility practices, labor, power and equipment requirements, and other crop production data.

Costs of producing different crops were computed by using physical requirements as reported by cooperating farmers priced at the 1956 level of farm costs. Returns were computed by pricing corn yields at the average 1954-56 month-of-harvest prices.

One fact emphasized by the survey is that per-bushel and not per-acre cost is the important item in corn production. Low

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per-bushel cost nearly always is associated with high yields. Per acre costs usually increase as yields increase, but there are ways to reduce per-acre costs and still get high yields.

The cost of raising an acre of corn varies from soil to soil. There also is a considerable difference between first year corn after a legume sod and corn that follows a legume sod by two or more years. In order to show costs and returns on a particular soil the data from the comparatively non-erosive silt loams of west-central Indiana have been chosen for illustration. Most of the more level silt loam soils in the Corn Belt are somewhat similar to these soils of west-central Indiana.

Table 1 shows average yield, cost and returns for selected farms in west-central Indiana. The cost of the first corn crop immediately following a legume sod is about $6 less than the cost of the second and succeeding crops. Purchased nitrogen accounted for nearly all of this cost difference.

Where fertilizer recommendations of the Purdue University Agronomy Department are followed, costs differ slightly from the averages shown in Table 1. For instance, on soils high in phosphate and potash, total per-acre cost for first year corn would run about $51; cost of second-year corn would jump to about $62, and of fourth year corn and beyond to about $67

FIRST-YEAR CORN NETS BEST RETURNS

TABLE 1

Per acre yields, costs and returns in the production of corn on selected in west-central Indiana, 1956, on non-erosive silt loam soils

	First Year Corn	Second or Succeeding Years' Corn[1]
Yield[2]	76 bu.	73 bu.
Gross Return[3]	$91	$88
Cost	52	58
Net Return	39	30

[1]This was mostly second year corn.

[2]Yields are considered to be average for present levels of fertilizations and other cropping practices employed on these farms. Corn was priced at $1.12 per bushel at harvest.

[3]Since corn was figured at harvest time prices, no charge was made for storage or any other extra costs involved in storage operation. Production costs include a charge for labor but no charge for management.

per acre. The increase largely is a result of using additional nitrogen to sustain high yields.

The variation of these estimates from the actual averages in Table 1 can be attributed to differences in phosphate and potash levels in the soils of the farms surveyed and the fact that many farmers were not using as much fertilizer (especially nitrogen) as might have been profitable.

The costs in Table 1 are representative of farms averaging 327 tillable acres in size with level silt loam soils of generally high fertility. A rule of thumb used in Indiana to adjust these costs for farms of other sizes and soil types is as follows:

1. Add or subtract about 4 cents per bushel for yield changes above or below 75 bushels per acre.

2. Add $2 per acre for level soils that are tight and hard to work.

3. Add $1 for each 50 acres below 200 tillable acres or subtract $1 for each 50 acres above 200 tillable. (The total adjustment for size should, however, be limited to a plus or minus $3.)

4. Add $3 to $5 per acre for rolling to rough land with small, irregular fields.

5. For soils testing low in both P_2O_5 and K_2O, add $3 to $4 per acre for extra phosphate and potash.

Relative Importance of Various Cost Items

Land charge (taxes and interest on investment) is a very important cost item in corn production on most soils. Land value is, of course, the determining factor. On the level silt loams, for instance, land charge was the largest single cost item for either first or second year corn—amounting to 35 to 40 per cent of the total per acre cost. On the less valuable sandy soils, however, it constituted only 18 to 20 per cent of the total per acre cost.

A higher percentage of farmers in Wisconsin own their own farms than in any other state, according to the 1950 census.

Fertilizer cost usually ranks second to land charge in producing first year corn, but often may exceed land charge for other than first year corn.

Table 2 shows the various cost items and the relative importance of each. These are average figures for the 313 farms representing five major soil associations.

Break-Even Point

The variation in yield among the 313 farms surveyed was as much as 50 bushels per acre from low to high on some kinds of soil. Average yield for all soil types was 76 bushels per acre and

average labor return was more than $5 per hour for first year corn.

Including both direct and indirect labor, these farmers were spending on the average, about 9 hours per acre in raising corn. Their net return per acre ran from about $33 on light, droughty sand to almost $45 on some of the heavier soils. Average net return was almost $41 after charging 94 cents per hour for labor.

Average corn yields of 90 bushels or higher are within the reach of many farmers on most of these soils provided a good fertility program and proper cultural practices are followed. Even with corn prices as low as $1 per bushel at harvest, 75 to 100 bushel corn yields usually give a good

VARIOUS COST ITEMS AND THEIR IMPORTANCE

TABLE II

Per acre cost of producing corn and various costs listed as per cent of total costs on 313 farms in west-central and northern Indiana, 1956[1]

	First Year Corn		Second or Succeeding Year's Corn	
Cost Item	Cost	Per cent of Total Cost	Cost	Per cent of Total Cost[2]
Direct labor[3]	$ 4.67	9	$ 4.73	9
Tractor use	6.48	13	6.65	12
Machinery	4.78	10	4.98	9
Seed	1.57	3	1.60	3
Fertilizer	9.25	19	11.54	21
Manure	3.45	7	4.45	8
Limestone	1.27	3	1.36	2
Land charge	12.74	26	13.37	25
Overhead and indirect costs	4.46	9	4.92	9
Misc. and failure cost	.61	1	.99	2
Total	$49.28	100	$54.59	100
Average yield (bu.)	76	—	75	—
NET INCOME PER ACRE	$40.67	—	$33.74	—

[1]This is average for 5 major soil associations studied. These soils were silt loam, light colored sands, dark colored sands, silty clay loam and muck.

[2]Mostly second year corn.

[3]This is only direct labor spent on crop; indirect labor is included in overhead and indirect costs.

net return.

Many farmers, however, do little more than break even on corn. This usually is because they don't shoot for high enough yields. High yields are a "must" for profits. For the farms studied, the break-even yields for most operators would fall within a range of 40 to 50 bushels per acre for first year corn and 45 to 55 bushels for other than first year corn. However, there can be a considerable variation in this bread-even point depending upon the soil, the tenancy arrangement and the production practices followed.

Opportunities for Reducing Costs of Producing Corn

Shooting for higher yields holds the greatest opportunity for reducing per-bushel cost of producing corn in most cases. This is because fixed costs — land charge, machinery investment, various overhead costs and sometimes labor — make up such a large proportion of the total cost. In some cases, these fixed costs may constitute 50 per cent or more of the total cost.

This is why a good fertilizer program is so important. A good fertilizer program includes not only applying the right amount for greatest net return, but applying it where and when it is needed and using the proper analysis and form for the particular soil and farming situation.

A group of 90 central Indiana medium-sized farms were surveyed in 1957 concerning their fertilizer practices. The one-third of these farmers using the most fertilizer in 1956 paid an average of $66 per ton and the average of the various analyses and materials used was 14-19-27. The one-third using the smallest amount of fertilizer paid $73 per ton for an average analysis of 10-18-19. This cost difference is accounted for largely by the fact that those using the most fertilizer tended to buy higher analysis goods.

Even though boosting yields holds the greatest promise for cost saving, most farmers probably could shave some from their labor, power and equipment expenses.

All costs shown in Tables 1 and 2 are based on conventional methods of growing corn, that is, plowing, discing, cultivating, etc. Newer cultural methods for growing corn such as minimum tillage, mulch tillage and others probably would cut production costs somewhat. Greater specialization in corn production, at least to the point where some pieces of equipment can be eliminated from the farming operation, also may reduce costs. If specialization is carried to an extreme, however, poor seasonal distribution of labor, power and equipment requirements may

tend to actually increase costs on some farms.

Some farmers may be cultivating or discing more than is necessary. To determine how much this extra work costs, see Table 3 which shows man-hours per acre required for each operation and total labor, power and equipment cost per hour and per acre.

COSTS FOR PERFORMING VARIOUS CROP OPERATIONS

TABLE III

Labor requirements and labor, power and equipment costs per hour and per acre for performing various crop operations in west-central and northern Indiana[1].

Operation	Man Hours Per Acre	Total Labor, Power and Equipment Cost	
		Per Hour	Per Acre
Disc stalks	.20	$3.33	$ .65
Plow sod	.74	3.18	2.36
Disc alone	.22	3.30	.71
Disc plus one implement	.23	3.56	.80
Chop stalks	.38	3.19	1.22
Plant corn and fertilizer	.25	3.57	.86
Rotary hoe corn	.22	2.98	.64
Harrow corn	.10	2.79	.29
Spray corn	.15	3.20	.47
Cultivate corn	.20	3.57	.71
Pick corn	.71	4.96	3.42
Haul and store corn (76 bu. yield)	.72	—	2.47

[1]Power and equipment costs per hour or per acre vary considerably from farm to farm due to differences in usage. A farmer that is over-equipped or a farmer on a small farm may have considerably higher power and equipment costs than those shown. Power and equipment costs shown here are for the most common size tractor and equipment used for various jobs on farms studied.

The cost per acre of raising soybeans, wheat, oats and alfalfa is not greatly different from that of raising corn. A principal reason for this is the fact that fixed costs are such a high proportion of total costs. For example, on the 313 farms studied, the first year corn costs were only $2 more per acre than for wheat, $4 more than for soybeans, and $7 more than for oats and alfalfa.

A farmer who owns his farm

and equipment can survive for a long time if he is able to meet his direct costs. But he must live on the depreciation of his assets.

With high fixed costs and lower grain prices, however, only the more efficient farmers can survive indefinitely and make a profit. Efficiency is measured in terms of ability to reduce per-bushel costs. Farmers certainly should strive to reduce variable costs (labor, machinery, fertilizer, spray material, etc.) but must be careful not to reduce returns more than costs. Some farmers undoubtedly can reduce some costs without reducing yields. Many farmers, however, can profitably spend more per acre for fertilizer, better seed and improved drainage in order to attain the high yield necessary for highest economic returns.

Winter Dairy Herd Care

G. A. Williams, veteran Purdue extension dairyman, offers these tips on winter care of the dairy herd:

"Give a cow plenty of good feed and keep her in a dry, draft-free place.

"Low temperatures are not a problem if the herd is well fed and has freedom to move about in a sheltered area.

"Without silage, a grain mixture of 500 pounds of ground shelled corn, 200 pounds of ground oats and 50 pounds of a 30 per cent dairy feed is satisfactory.

"If the quality of the hay fed is good, the grain ration need not be as rich in protein.

"A pound of trace mineralized salt and two pounds of steamed bone meal should be mixed with each 100 pounds of grain in the ration. Mineral should also be available free choice in the feed lot.

"An easily available supply of fresh, clean water should not be overlooked."

Williams says that young animals should not be left to take care of themselves during the winter months. Bred heifers need only plenty of hay and silage up to within six to eight weeks of calving to maintain their bodies. Then they should receive some grain until calving time. Calves under a year need some grain in addition to roughage, he adds. —*Farm News from Purdue*

Chimney Smoke

by Irene Rudie

May the sun be warm and kind to you;
The darkest night some star shine through;
The dullest morn some radiance bloom,
And when dusk comes—God's hand to you!

★ ★ ★

Every farm yard has room for a few more of the trees and shrubs that are beautiful not only in form, in flowers and foliage, but that also attract the songbirds with their fruits. Among these are the pin cherry, thornapple, highbush cranberry, blackhaw, and mountain ash.

★ ★ ★

It takes a few days on a fundraising drive to learn of the serious financial b u r d e n s one's neighbors are struggling with.

★ ★ ★

The best informed people on happenings in the neighborhood are those who have a well-worn spot on the floor beneath the party-line telephone.

★ ★ ★

Parents give a lot of thought to choosing just the right name for junior, only to hear him called Spud, Punk or Jake, when he grows up.

A child who turns up his nose at food lovingly prepared for him is irritating enough, but not as much as the dog who walks away from his meal with an injured look on his face.

★ ★ ★

Red barns and red school houses are disappearing from the rural landscape only to have red-barn colored houses show up in the cities.

★ ★ ★

For a happy and successful life, live not only as if every day were your last on earth, but treat everyone you meet as if it were his last day too.

★ ★ ★

The reason they didn't build so many closets in the old houses is that they didn't have many clothes. Mother washed out Susie's school dress on Saturday and she wore it again on Monday.

Subsoil Rippers on Level Ground

Some Minnesota farmers rip all crop land to get moisture into the subsoil; others chisel for better drainage . . .

Condensed from The Farmer

SUBSOIL rippers are being put to a slightly different use across parts of the middle west these days.

Used for the past few years to rip single, contour furrows across pasture hillsides to catch downhill water and force it into dry, hard slopes, rippers are now being used to do about the same thing on level farm land.

Martin Pederson, Brookings county, South Dakota, used a single-tooth ripper plow to cut deep furrows diagonally across two comparatively flat bromegrass pastures. He ripped straight across a slight slope on an eight-acre brome field that hadn't been plowed since 1953, and did the same on a 27-acre brome field seeded four years ago.

His goal: "To get moisture into his subsoil."

Soil on both pieces was well packed and "pretty hard." Rain wasn't soaking in. The fields needed renovating, but both would plow hard and turn in big, tough chunks of dirt.

Catches Snow and Rain

So Pederson ripped them, setting the one-tooth chisel down 12 to 14 inches in single furrows about eight feet apart. That was done in late summer, after harvest. Each field will be left that way over winter to catch snow and let moisture, from both snow and rain, soak into the subsoil. This spring the fields will be gone over with a cultivator to tear the sod, then plowed and seeded to an alfalfa-brome mixture. The ripped furrows are only a few inches wide at the top, and Pederson anticipates no trouble plowing them, especially since they were ripped on the diagonal.

A neighbor, Floyd Brelsford, has been ripping fields on his farm for the past two years.

He ripped a 40-acre, slightly rolling oats field two years ago, just after harvest, left it alone for a month, then plowed and planted it to corn the next spring. "I had good hard corn a year ago, when much of the corn around here was immature," says Brels-

Reprinted by permission from The Farmer, 55 East 10th St., St. Paul 1, Minnesota

ford. "I figure by ripping and getting rain down into the subsoil my corn had plenty of moisture to keep growing, and matured before frost."

Since that first trial two years ago, he has ripped all crop land on his farm, using a single-tooth, commercial chisel set 18 to 20 inches deep. Furrows are six to eight feet apart. A four-bottom, full-track diesel pulls the chisel. Cost of diesel fuel for ripping is about 20 cents per acre. He can chisel 40 acres in a ten-hour day.

He ripped that first 40-acre field again this year, going over it in mid-August, shortly after harvest. "I like to break up the subsoil as early as possible, then fall plow. By getting it done early, soil has longer—six to eight months—to soak up rain and snow moisture before seeding," he points out.

The per capita consumption of chicken and turkey in the U. S. increased by 2.6 pounds last year.

"My fields plow easier, even after only one and two rippings. Clods are smaller and the soil is looser, he adds.

Brelsford demonstrated the improved texture he was talking about by digging down a foot to 18 inches with his hand in the small grain stubble.

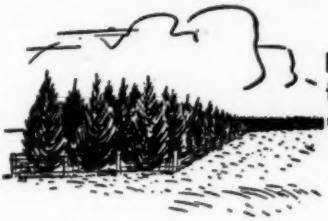
"Moisture moves into the loosened soil more easily. Below a six to seven-inch dry layer I could squeeze handsful of mud all summer this year, when other cornfields were drying up."

Brelsford rips on the contour the first time over his fields, even though slopes are gentle. The second time over, two years later, new rips were made crosswise to the original. Once he gets over all fields for the second time he figures to rip only about every four years—probably on ground the fall before it is to be put into corn.

He made another use of subsoil furrows two years ago—soil drainage. In one corner of a field which was low and poorly drained, he ripped furrows down the slope. That gave him sufficient drainage to produce good corn in a low spot where, before, he hadn't been able to raise corn.

Others have used subsoil rippers for drainage by bolting a chain with a round, metal ball on its end behind the chisel tooth. By pulling a mole, as it is called, through the ground, a small, subsoil drainage ditch is left to carry water to a low spot or drain ditch, taking good care of drainage for possibly two years. Also, a wider blade can be bolted to the chisel to break a wider swath of subsoil. The normal, tooth chisel breaks about a one-foot wide subsoil furrow.

Use Your Woodlot Wisely, Money DOES Grow on Trees



How home grown lumber built a 24 x 100-foot machine shed at a construction cost of less than $1,000 . . .

Condensed from Wisconsin Agriculturist

WOODLANDS are wastelands to many farmers. But this need not be the case.

With a little time and effort on your part, you can make your woodlot pay. Many farmers have.

For example, Rudy Mohr, Jefferson county, Wisconsin, figures his 15-acre woodlot is a valuable piece of land. "I just finished building a 24 x 100-foot machine shed. All the lumber for it came out of my woods," he says.

It took Mohr about a month to construct the building. He did all the work himself. In all, he used about 8,500 board feet, most of which was oak.

Since his neighbor has a sawmill and trades work with Mohr, sawing didn't cost Mohr anything. He bought only concrete, nails and door hinges. The total cost of these was less than $1,000.

Wood and Syrup, Too

"At a lumber yard I would have had to pay about $150 per 1,000 board feet for lumber of about the same quality," Mohr says. "For 8,500 board feet, that would be $1,275. Having home-grown lumber means quite a saving."

Mohr puts his woodlot to other uses, too. Last year he harvested 80 gallons of maple syrup. At $5 per gallon that's $400. Also, the woods supplies the annual needs of fuel wood and fence posts.

Figures show the average farmer needs and uses 1,000 board feet of timber products yearly. Home grown timber saves the cost of buying lumber at today's high prices.

A dairyman in Waukesha county, Wisconsin, built a barn recently and says he saved several thousand dollars by using lumber from his 45-acre wood

Reprinted by permission from Wisconsin Agriculturist, Racine, Wisconsin

lot. "I used 7,000 board feet of lumber in the roof alone," he says.

Figuring his labor at $1 per hour, it cost about $20 to cut 1,000 board feet of timber. Add to this another $20 for sawing, and the lumber cost him $40. He figures home grown lumber saves him more than $100 per thousand board feet.

This farmer says he cuts out the poorly formed, hollow and rotten trees. This provides a more suitable growing place for younger trees and increases the growth rate of more desirable species. Good woodland management such as this is the best way to meet present and future demands for timber.

Dew is an important source of moisture for Midwest crops. In Ohio tests, dew accumulation amounted to 10 inches of moisture during a year. Some years this amounts to 20 per cent of the total water supply for the crop.

Those who have plenty of good timber can market what they do not use at home. Most farmers agree that cutting logs during the winter is a much better method of supplementing their income than getting a part-time job.

"When I have spare time in the winter, I cut cherry wood and sell it to furniture manufacturers," this farmer said.

Many farmers in the northern counties sell pulpwood.

One of the most common mistakes is to pasture woodlots. Experiments prove woods not only make poor pasture, but that a pastured woodlot soon becomes worthless for any serious wood production.

When cows graze in a woods, they trample and eat small trees. Rot and decay start where tree roots are scarred. Tree growth is slow. In one Michigan woodlot, grazing reduced the annual yield of timber from 189 board feet per acre to 87.

Woodlot Is Poor Pasture

Prolonged damage by grazing destroys as many young trees as fire, insects, disease, ice breakage and wind damage combined. Tree roots suffer from lack of aeration due to trampling and compaction of the soil by livestock.

Woodland pastures average only about 275 pounds of dry forage per acre. This kind of feed contains only about 8 per cent protein, so the year's yield is about 22 pounds of protein per acre.

Good open pasture gives 4,000 to 6,000 pounds of forage. Protein content averages 14 per cent, or 700 pounds per acre. This is 31 times as much as a woods pasture yields.

Fall Fertilization Gives Crops A Boost

It pays to buy and use fertilizer when work is light in the fall. There are many advantages.

Condensed from The Indiana Farmers Guide

Fred Myers

FOR every dollar wisely invested in fertilizer, a farmer can expect to realize a return of from three to five dollars. Adequate fertilizer, when properly applied, can improve yields by as much as 100 per cent.

But fertilizers can't do their job if they are in a sack or bin. They must be placed in the soil where they can work effectively toward providing greater crop yields and greater profits. This is a year 'round job.

Most farmers fertilize in the spring of the year but fall fertilization has several important advantages.

Why in the Fall?

Work load. Most farmers are extremely busy in the spring. If they have to apply fertilizer in addition to plowing, planting, and cultivation, the job may be only partially or never completed.

Storage. Fertilizer in the soil won't occupy valuable storage space.

Field Conditions. Soil is generally more firm in fall than in spring after winter's freezing and thawing. Soil compaction, an enemy to proper root growth, will be much less in fall.

Availability. Farmers will find they can come much closer to obtaining the right fertilizers, both in ratio and grade, in the fall than during most any other time of the year. Low demand insures immediate delivery.

Effectiveness. Fertilizers applied in the fall will give spring seedings and pasture legumes and grasses the boost they need for a good start at the beginning of the growing season. This promotes earlier maturity and gives the crops a head start on weeds.

Nitrogen

Some precautions must be taken in applying nitrogen in fall or early winter. Some nitrogen fertilizers have a strong tendency to lose their effectiveness through leaching during the winter. Nitrate nitrogen, for example, is not held tightly by the soil as are the ammonium and urea forms.

Reprinted by permission from The Indiana Farmers Guide, 725 Warren St., Huntington, Indiana

However, it's best to apply any nitrogen fertilizer after the soil temperature has dropped to at least 55 degrees.

Another point to consider is soil type. Ordinarily, nitrogen should not be plowed under on well drained or sandy loams. In these soils, ammonia is rapidly converted to the nitrate forms of nitrogen and is likely to be lost through leaching during the winter or early spring months.

Top dressing of winter cereals and pastures gives very good response. In one college experiment, 50 pounds of nitrogen on wheat produced an average increase of about 13 bushels per acre regardless of the date of application from planting time until late March.

Phosphate and Potash

These fertilizers can be applied wherever and whenever they are needed. Leaching is not serious with either of them. Top dressing with phosphate and potash in the fall decreases alfalfa winter kill and promotes quick spring growth. This means extra days of grazing and lower feed bills.

Self-Fed Lamb Rations Promote Fast Gains

Modern, complete, self-fed lamb-fattening rations will give feeders faster and more efficient feedlot gains. But the limit has not yet been reached, says U. S. Garrigus, head of the sheep division at the Illinois Agricultural Experiment Station. Individual lambs on tests at the University have gained as much as a pound a day.

Further experimental work with protein requirements of lambs, higher protein corn, antibiotics, synthetic hormones, different mixtures of ingredients and pelleting all will help to improve lamb rations, Garrigus believes.

One experiment at the University of Illinois has shown how feeding periods of 30 to 60 days in drylot can take the place of the older 90 to 120-day hand feeding schedules. Average daily gains of five lots of lambs self-fed a complete mixed ration was .57 pound a day compared with .36 pounds a day for similar lambs hand fed only ground shelled corn and alfalfa. These lambs weighed an average of 71 pounds at the start of the 52-day test.

Self-feeding a complete mixed ration to lambs has proved to be a big labor-saver and usually results in more uniform lambs. This and other experiments also have shown that the better the ration, the lower will be the response to pelleting the feed. —*Farm News*

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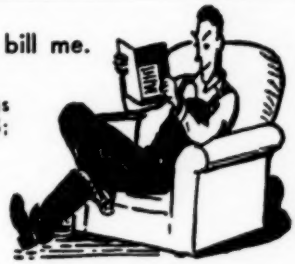


Here's a sketch of our farm where we publish Farmer's Digest. Our 200-acres are planted to corn, alfalfa, grass and trees. We farm — and we publish our magazine on a farm — because we believe that's the only way we can know what other farmers want to read. Farmer's Digest is probably the only farm magazine in the world published on the farm by farmers.

How Much Can Poultrymen Expand?

Study these trends before making your decision about the future of the poultry industry . . .

Condensed from
Michigan Farm Economics
H. E. Larzelere

HOW much can the poultry industry in the U. S. expand without incurring disastrously low prices? This is a basic question that confronts the poultrymen now.

Look at the economic trends of the three major products (eggs, broilers and turkeys) and you see that the three have not followed the same pattern.

Eggs

The large swings in annual prices of eggs have accompanied small changes in production.

In 1948, about 48 billion eggs were sold at an average U. S. farm price of 47 cents a dozen. In 1956, a record production year, 55 billion eggs sold for an average of only 39 cents a dozen.

While it is dangerous to say that past trends will continue, the past is the only foundation we can rely on in planning for the future. Also we must remember that population growth, international conditions, relative prices of other foods and improved technology of production may alter the future pattern of these trends.

A lowering of egg prices will apparently not move larger egg supplies through trade channels into consumption. While we might say to you as an individual, "expand your laying flock," we would not want to say this to everyone who has laying hens today. In other words, we would discourage promiscuous expansion in egg production facilities.

Your annual average price will be higher if you increase production during the seasonally high priced months. Improving quality of eggs will also generally increase the price you receive.

Broilers

In the broiler industry, production has been increasing faster than prices have been declining.

In 1949, one and a half billion pounds of broilers (live weight)

Reprinted from Michigan Farm Economics, Michigan State University, East Lansing, Michigan

were produced and sold for an average U. S. farm price of 28 cents a pound. In 1957, nearly four and three-fourth billion pounds were produced and sold for an average farm price of 19 cents a pound.

On a trend basis, this means that the total U. S. production could have increased by about 270 million pounds each year without a significant price decrease. This is a smaller yearly expansion than has taken place in the last several years.

We can say, then, that 270 million pounds is a reasonable rate of annual increase for the next year or two. Of course, further technological cost reducing factors may permit lower prices and thereby slightly larger expansion.

Turkeys

In the turkey industry, production has increased somewhat faster than prices have been declining.

In 1949, about 750 million pounds (live weight) sold at 35 cents a pound, U. S. average farm price. In 1957, 1,340 million pounds sold at 23 cents a pound.

This indicates that an annual increase each year of twenty-six and a half million pounds could have taken place without a significant decline in turkey prices. This suggests a reasonable rate of annual increase.

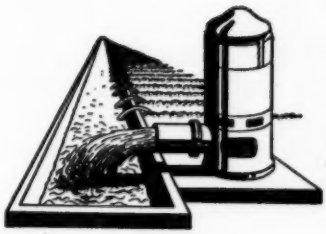
Summary

Nationally, modest expansion in the broiler and turkey industries can be warranted in the next several years. However, considering present uses of eggs, national expansion of the industry is questionable.

Keep in mind that this information refers only to national production. It does not say that any single state should logically follow the national rate of change. However, it does mean that each producer will want to observe the composite national changes as one of several factors influencing future plans.

Wouldn't it be just our luck, after spending millions and millions of dollars to hit the moon, we find an agricultural planet that will be willing to export grains and livestock to us for little or nothing due to their large surpluses.

Good Cows Are Thrifty — One cow producing 10,000 pounds of 4 per cent milk per year will return as much income beyond feed costs as three cows that produce 5,000 pounds of 4 per cent milk. Also, three low producers require three times as much labor as one good cow. Keep dairy records so you can cull out low producers.



Fertilizer and Water A Winning Farm Team

A farmer shouldn't waste money on supplemental irrigation unless he's willing to use fertilizer heavily . . .

Condensed from Better Farming Methods

THE farmer's profit in today's squeeze of rising costs, labor shortages, acreage controls, and increasing competition depends on how much he can improve the efficiency of his operation.

The farmer can fight the problem in two ways:

He can increase per acre yields without increasing production costs proportionately.

Or he can lower his production costs without reducing yields.

The initial step toward these goals is to use recommended varieties, fertilization, insect control, and other improved management practices. Beyond this point, supplemental irrigation offers great possibilities for increasing efficiency of crop production.

It Takes More than Irrigation

The use of supplemental irrigation is not a cure-all. First of all, it increases the crop's need for plant nutrients. Thus, without adequate fertilizer, less economical crop production will often result than without irrigation. This, is, of course, just another way of saying that if we are to get the most benefit from irrigation we must keep fertilizer from limiting yields.

Let's look at some actual crop yields that show how fertilization and irrigation work as a team when properly balanced. We'll use nitrogen as an example since it is the most frequently deficient plant food.

Here are the results of experiments carried out at Thorsby, Alabama:

Bahia grass grown with plenty of phosphate, potash, and lime, but without nitrogen or irrigation, made only 1,000 pounds of hay.

Irrigation without nitrogen raised the yield one-half ton.

Reprinted by permission from Better Farming Methods, Mount Morris, Illinois

Six hundred pounds of nitrogen without irrigation raised it only 2,250 pounds.

When 600 pounds of nitrogen and irrigation were used together the yield of hay was increased by more than seven tons.

The same kind of relationship will be found between the other major fertilizer elements and irrigation.

How About Corn Irrigation?

This is the kind of effect we find in experiments at many locations and with a number of crops. Take the case of corn. Hundreds of experiments have been carried out with rates of fertilizer on corn, and some with different levels of irrigation, but very few where the two were combined.

Another good thing about telling the truth is that you don't have to have such a good memory.

One way of getting around this lack of direct information is to use results of corn tests with and without nitrogen in dry years, and on the same experiments in years of good moisture.

In tests run at the North Carolina Experiment Station between 1944 and 1952, for example, 160 pounds of nitrogen increased corn only 43 bushels over no nitrogen in the drier seasons, but in good moisture years the same rate of nitrogen increased yields 73 bushels.

In this case, the additional moisture made it possible for the same amount of fertilizer to produce 30 bushels more corn.

Same Story with Cotton

Cotton production in the Southeast can be increased just as much as that of other crops.

These are the results of cooperative ARS-Alabama Agricultural Experiment Station experiments:

The use of irrigation without nitrogen fertilization increased seed cotton yield 424 pounds.

Two hundred forty pounds of nitrogen without irrigation increased the yield only 339 lbs.

But when 240 pounds of nitrogen were applied together with a good level of irrigation, seed cotton yield was increased 3,085 pounds per acre for a total yield of 4,999 pounds per acre. (At this high yield, a serious lodging problem developed.)

With irrigation, the last 120 pounds of nitrogen produced 10 pounds of seed cotton per pound of nitrogen; without irrigation, it gave no increase in yield.

These results were made possible by carefully following all known good practices including destruction of a traffic pan in the soil, the use of soil fumigation, heavy application of lime phosphate and potash, early

planting of a recommended variety, and effective insect control.

Failure to utilize these other good management practices could easily prevent the nitrogen and the moisture from being used effectively.

More Efficient Production

There is one other very important way in which adequate fertilization improves efficiency of crop production. Crops that are well fertilized can make more growth and yield on the same amount of water. Results reported by research workers in Texas illustrate this point:

Coastal Bermuda grass requires about 13 acre-inches of water to make one ton of hay without nitrogen.

It needs only six inches to produce a ton when fertilized with 120 pounds of nitrogen.

We know from other experiments that nitrogen fertilization has the same kind of effect on other crops such as corn and cotton.

Since the water supply very often determines the practical use of irrigation on farms, the possibility of stretching the available water in this way is extremely important.

These observations lead us to one conclusion: A farmer certainly should not spend the money required to get into supplemental irrigation unless he is ready to use high rates of fertilization and all other known improved practices.

Split Boot — Out-moded Applicator

In spite of the trend towards higher analysis and also higher rates of fertilizer, many still use the same application equipment today as in 1949 — namely the split boot.

With low analysis fertilizers and at slow planting speeds, the split boot was fairly satisfactory. However, just where the split-boot applicator will place the fertilizer depends on the speed of planting and compactness of the seedbed. With today's high speed planting, the fertilizer tends to be drawn in close to the seed. With compact seedbeds, the fertilizer may be deposited very close to or on the soil surface.

Split-boot placement has and will give good returns from small to moderate applications of fertilizer. However, those who still use the split-boot attachment should plant at slow speeds and plan to supplement their small "starter" applications with broadcast fertilizer.

—American Potash Institute

Soil Acidity, Growth of Vegetables

In the case of vegetables, which include many different plant families, the degree of acidity of the soil has an important effect on yield, health of the crop, and uniformity of maturity at harvesting time . . .

Condensed from The Agricultural Gazette of New South Wales

SOILS which have proved very suitable for the growth of cereals and grasses often cannot be turned over to maximum production of vegetables without adjustment of acidity. This applies particularly in soils which are strongly acid in their virgin state.

There is a widespread, though erroneous, impression that all acid soils are undesirable and that the aim of the farmer should be to correct the acidity and render them "sweet." The facts are that some plants flourish only in strongly acid soils, and most grow best when the soil is mildly acid. There is, however, an optimum, or most congenial, range of soil acidity for each vegetable —that is, a specific range of soil acidity at which the vegetable will make most satisfactory growth. The aim of the grower should be to provide the acidity best suited to the particular crop.

Soil acidity influences plant growth chiefly by affecting the availability to the plant of essential minerals, by the liberation or formation of toxic substances in the soil, by its effects on the formation of humus and, later, nitrates, by bacterial action and on the development of nodules by leguminous plants, or by encouraging or retarding certain soil-borne diseases (*e.g.*, potato scab).

The degree of soil acidity is really an indication in a general way of the chemical condition of a soil. If a soil is very acid, it is usually an indication that calcium and magnesium and also possibly potash, all of which are essential for plant growth, are in short supply. In a very acid soil, other minerals, particularly manganese and aluminum, may come into solution in amounts which will be toxic. Another effect of an acid soil is to make unavailable the molybdenum (one of the six essential "minor" elements) in the soil.

If a soil is too alkaline (the opposite to acid), the other five

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essential minor elements — iron, manganese, zinc, copper and boron—tend to be relatively unavailable because they are not readily soluble under these conditions. This effect is most marked in the case of iron, manganese and zinc.

Symptoms usually developed by plants when attempts are made to grow them in soils which are too acid or too alkaline are retarded growth, paleness, complete or partial yellowing and in some cases, death of parts or the whole plant. Under less extreme conditions, however, plants may make moderate growth and appear satisfactory although yielding neither the quality nor quantity of crop they would under optimum conditions of soil acidity.

Don't subject dairy cattle to abrupt changes; production is likely to drop.

The determination of the pH (scale for measuring acidity) of a soil is fairly simple, but for accuracy it is generally undertaken by soil chemists. Mixed samples of five or six separate collections of an ounce or so of surface soil from different parts of the area under question are all that is necessary to make an accurate soil test.

pH Values for Various Vegetables

The pH values at which the different vegetable crops may be expected to make the best growth when other conditions are favorable are given in this table:

CROP	Optimum pH Range for Growth
Asparagus	6.0—7.0
Beans — French	5.5—7.0
Beans — Navy	6.0—7.0
Beans — Soy	5.5—7.0
Beet	6.0—6.7
Cabbage	5.5—6.7
Carrot	5.2—6.7
Cauliflower	6.0—6.7
Celery	5.5—6.7
Cucumber	5.5—6.7
Lettuce	5.0—6.5
Onion	6.0—7.0
Parsley	5.0—7.0
Parsnip	6.0—6.7
Pea	5.8—6.7
Potato*	4.8—7.0
Radish	5.2—6.7
Rhubarb	5.5—6.5
Rock-melon	6.0—6.7
Silver Beet	6.0—6.7
Spinach	6.0—6.7
Sweet Corn	5.0—6.5
Sweet Potato	5.2—6.7
Tomato	5.2—6.7
Turnip — Swede	4.8—6.5
Turnip — Table	5.2—6.7

*pH 4.8—5.4 to be preferred because of common scab disease.

Highly acid soils are especially undesirable in the growth of peas, beans and other legumes. Deficiency in lime and phosphates, usually associated with such acid soils, retards growth, but, worse still, tends to prevent develop-

ment of root-nodule-forming bacteria which assist in supplying nitrogen to the legume by the fixation of this nutrient from the air. Inoculation of seed of leguminous crops with nodule bacteria is rarely very successful if the soil in which the crop is sown is more acid than pH 5.5.

Fertilizers and Soil Acidity

Application of sulphate of ammonia tends to make a soil more acid, while nitrate of soda decreases soil acidity slightly, but not to the extent which sulphate of ammonia increases it. The use of superphosphate increases soil acidity very slightly. Sulphate of potash and muriate of potash have little effect on soil acidity. Thus, where large quantities of sulphate of ammonia or mixed fertilizers containing it are used, there may be an appreciable increase in soil acidity and a greater necessity to use lime or dolomite than on similar soils to which sulphate of ammonia has not been applied.

Correcting Acidity

Soil acidity is one factor which is largely under the control of the grower. Correction of acidity is best made by the addition of finely ground limestone or dolomite lime to the soil, preferably some months before a crop is sown or planted out. The rate of application necessary will vary with type of soil as well as its degree of acidity. In the case of an average loam, an application of 1½-2 tons of lime per acre would be necessary to change the pH of a soil from pH 5.0 to pH 5.8 or 6.0.

The lime is best broadcast and plowed in. Further, lighter applications may be necessary every two or three years. With leguminous crops which are sown in drill rows in soils more acid than pH 5.5, light applications of lime along the rows may be profitable. Lime and superphosphate may be mixed and drilled in together.

Find Best Varieties of Seed — Seed catalogs for 1959 from seed houses throughout the country are now available to gardeners. Many new varieties of garden crops are listed. Many gardeners find the best varieties for their growing conditions by testing one or two new varieties each year. For a list of varieties which have already been found to be satisfactory for your area, contact your county agent or vocational agricultural instructor.

You Can Farm More Efficiently

Efficiency and quality are the keys to farm profits. Here is an outline to successful practices . . .

Condensed from Science For The Farmer

Fred A. Hughes
Pennsylvania State University

FIRST concern of a farm operator should be to produce a quality product at the lowest possible cost.

Below are ways to make your farm return more profit dollars:

1. Improve Crop Program

Each farm family should examine their crop program as the first step in developing a sound farm program. The crop rotation should fit the needs of the livestock enterprise. A crop rotation of corn, small grain, and 3 years of hay will return much more income than a rotation of corn-oats-wheat and 1 year of hay on a farm with a dairy enterprise.

Forage is the cheapest source of total digestible nutrients (TDN) for production of livestock products. The cost of 100 pounds of TDN in various types of feed would be about as follows:

Protein Supplements	$5.00 to $5.50
Home Grown Grains	$2.65 to $3.50
Hay and Silage	$2.00 to $3.00
Pasture	$ .75 to $1.00

2. High Yield A Necessity

Many of the costs of growing an acre of crop are fixed. High yields are essential to reduce the cost of each unit produced. Some additional fertilizer on a crop will often yield a return of 2 to 5 dollars per plant food dollar invested. It is estimated that to grow an acre of corn yielding 50 bushels of shelled corn or 8 tons of silage the cost will range between $60 and $70 per acre. This same field with an additional $15 to $20 worth of fertilizer and sufficient plant population could yield 80 bushels of shelled corn or 12.8 tons of silage. This would involve some extra capital but it would be returned the same year—barring dry weather or other damage.

On legumes an application of 300-400 pounds of 0-20-20 or 0-15-30 could boost yields to 3 tons per acre. A hay field that is predominantly grass could be maintained with a treatment of

Reprinted from Science For The Farmer, College of Agriculture, Pennsylvania State University, University Park, Pennsylvania

nitrogen, thus reducing costs of reseeding.

3. Pasture Makes Low-Cost Feed

On a Western Pennsylvania farm a 16-acre bluegrass pasture that received nitrogen supported 25 cows for over a month of continuous grazing. The cows were unable to keep ahead of the growth. A pasture program including bluegrass, orchardgrass, ladino clover, trefoil, sudan or other mixtures would supply 5 months or more of good feed that the cows harvest, thus reducing costs.

4. Feed Your Cows

Many farmers talk about buying better cows. The worst livestock disease we have at present is "Hollow Belly." A good forage program is the best cure possible for this ailment and it won't cost as much as buying new cows. If production doesn't respond to plenty of good quality forage, then it is time to consider buying better cows. One farmer in 2 years increased his milk production from 7500 to 11,260 pounds with an improved forage program.

Costs of producing 100 pounds of milk on farms in Dauphin and Perry Counties in Pennsylvania last winter ranged from $4.22 to $7.36. Invariably those farmers producing milk at the lower cost had the higher milk production per cow, a good forage program, and an efficient chore labor routine.

5. Reduce Chore Labor

Labor can be made more efficient with a minimum of capital investment. Rearrangement of chores and a managed milking program will reduce time spent on cows. I remember one farmer who didn't think cows could be milked in 3 to 4 minutes. He was taking 2½ hours night and morning to milk 23 cows. When he changed to managed milking he cut his milking time by one hour each milking.

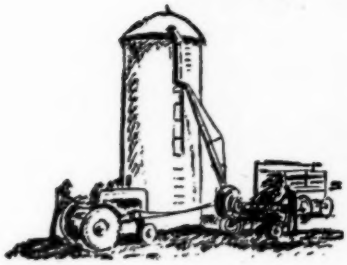
A man working in hot weather will lose a quart of water by sweating each hour. Men have been known to sweat up to a gallon per hour.

In the milk cost records referred to above, the time spent per cow per year ranged from 81 hours to 230 hours. Certainly the latter figure shows ineffiency in doing chores.

6. Machinery Costs Vital

Over-investment in farm equipment has led to increased costs per acre on many farms. The fixed costs per acre of owning farm equipment will be high on farms with small acres. A very large yield is often required to carry this high fixed cost. More cooperation between neighbors on joint ownership or trading of equipment could help solve this problem.

Silage and Moisture



Tips from a man with many years of silage making experience will pay off in your silo. Moisture content is the big secret, he says . . .

Condensed from The Kraftsman

IF the silage you put up last year isn't turning out as well as you would like, perhaps some tips from a man with many years of silage making experience will pay off when silage making time rolls around again.

A. G. Van Horn, until his recent retirement, served as superintendent of the Tennessee Dairy Experiment Station at Lewisburg. For 9 years Van Horn participated in the various trials carried on at the farm in an effort to learn better ways of making silage. These experiments have produced a wealth of information.

"One of the big secrets about making good silage," says Van Horn, "is moisture content of the materials. Most people make the mistake of putting in silage when it's too wet."

Too much moisture can be a problem with grass and legume silage as well as corn and sorghum silages, says Van Horn.

All this brings the farmer face to face with a decision between direct cutting or the wilting method of silage making when using grasses and legumes.

Experience at the Tennessee Dairy Experiment Station seems to favor the wilting method, although it does have some drawbacks.

Take a look at what researchers at the farm have learned about silage materials that are too wet when put in the silo. First of all, if they contain more than 70 per cent moisture they may produce silage with a putrid and very undesirable odor. Secondly, a preservative, such as sodium metabisulfite, is necessary to obtain fermentation and palatable silage.

Recently much research work has been done to determine the amounts of nutrients lost through seepage from materials containing 70 per cent or more moisture. A 10 by 40 foot tower silo on the

Reprinted by permission from The Kraftsman, 500 Peshtigo Court, Chicago 90, Illinois

Tennessee farm was filled with 180,000 pounds of alfalfa and orchard grass containing 76 per cent moisture. Seepage from this material amounted to 31,000 pounds or 17 per cent of weight of material ensiled. This seepage was analyzed and it was found that 10 per cent of the total dry matter placed in the silo was lost in the form of soluble nutrients. These results are confirmed by similar experiments.

While many farmers prefer the direct cut method because it avoids the separate mowing and raking operations, the wilt method does have these advantages: 1. Moisture content can be better controlled. 2. Preservatives are unnecessary. 3. Hauling of much unneeded water (plant moisture) is avoided. 4. Loss of nutrients through seepage is prevented if materials contain less than 70 per cent moisture.

When making silage of corn or sorghum Van Horn suggests that it not be cut when too green. "Let it mature just a little to bring the moisture down," he advises.

In summing up the matter of direct cut versus the wilt method, Van Horn has this to say:

"We suspect, but don't know for sure, that farmers lose more in loss of nutrients through seepage they get with direct cutting than they gain by the simplified operation. This is something we are working on."

Widespread use of silage is something relatively new to the southern states. More of it being made each year. Van Horn recommends that farmers considering silage study the possibility of growing and ensiling alfalfa. At the Dairy Experimental Farm it has been found that the Buffalo variety is best adapted for their use.

Similar testimony to the value of alfalfa comes from E. J. Chapman, superintendent of the Middle Tennessee Agricultural Experiment Station at Spring Hill.

Chapman reports that alfalfa lost a lot of popularity in the Volunteer State between 1949 and 1952 when the records show, acreage of alfalfa dropped from 183,000 to 100,000. According to his tests lack of soil potash and boron probably led to the poor yields which undermined this legume's usefulness.

"With proper soil treatment and management," says Chapman, "Tennessee farmers can produce good alfalfa."

Milk For Shaving Cream — A shaving cream manufacturer has developed a formula for shaving cream that uses milk. The company claims the milk serves as a buffer which helps to prevent rash action of the soap and water mixture on the shaver's face.

Interpreting Soil Tests for Top Yields

Most farmers using soil tests today are not interested in recommendations for average production. They want top yields consistent with the economic framework in which they are operating . . .

Condensed from
Better Crops With Plant Food

W. D. Bishop, Extension Service,
University of Tennessee

RAPID chemical soil tests are now made by most Land-Grant Colleges and many commercial organizations. In general, these tests are used to make sound fertilizer and lime recommendations to farmers.

Soil testing is one of the best diagnostic tools available for determining nutrient requirements. Through this "tool," information about the relative level of plant nutrients in the soil can be obtained and the amount of each nutrient needed can be predicted. Soil testing is the most popular technique used in making fertilizer and lime recommendations.

Before soil testing reached its present development, many farmers waited for deficiency symptoms to tell them they were running out of a plant nutrient—an *inefficient, dangerous method.* When plants reached this stage, profits had been declining for some time.

We now realize that even though plants do not show signs of deficiency, they may be producing *below* the *most profitable* level. We say they are suffering from *hidden hunger.*

How can you recognize such a stage if the plant shows no visible signs? This is where soil testing really serves its best purpose. By following a regular program of soil testing, the farmer can avoid loss in yields and low profits brought on by *hidden hunger.*

Most soil tests reveal about four or five different fertility conditions—*very low, low, medium* and *high.* Many states divide the high group into high and very high. In discussing these groupings, we must consider the crop in question.

For example, a report stating that soil tested *medium* in potash carries different recommendations for different crops. In this

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case, a *low* fertilizer recommendation would be made for wheat, *medium* for corn, *high* for alfalfa, and *very high* for tobacco.

What type of plant growth can be expected at each soil fertility level? Most crops grown on soils of very low fertility produce low yields of poor quality. Plant nutrient deficiencies or hunger signs will often be evident on such soils. Through the use of sufficient amounts of plant nutrients, the deficiencies will be corrected and yield increases obtained.

Likewise, an increase in crop yields will result when soils of low to medium fertility levels are properly fertilized. However, many crops grown on such soils will not have striking hunger signs. Therefore, *soil testing becomes very important in isolating areas where no apparent deficiencies occur yet top yields are seldom obtained.*

Build Up Soil Fertility Levels

Production cannot be as high on soils of very low or low fertility as on medium to high fertility soils. This makes it important to build up the fertility level for profitable yields.

In many parts of the United States, nitrogen cannot be stored in the soil very long. Therefore, nitrogen fertilization is normally based on the needs of a particular crop for one year or, to be more specific, on the crop needs during a certain time of its growth.

Phosphorus and potassium levels can be maintained at high levels in many soils. *These plant nutrients are needed in rather large amounts by most plants.* Alfalfa fertilization experiments conducted during 1953-1956 at the Middle Tennesee Experiment Station by Dr. W. L. Parks showed approximately 50 pounds of K_2O (potassium) removed per ton of hay.

In the same experiment, potassium levels in the soil were increased from approximately 200 pounds of exchangeable potassium per acre in 1954 to over 450 pounds in 1956 *where 200 lbs. of K_2O were applied annually.*

"I am ready to meet my Maker. Whether my Maker is prepared for the great ordeal of meeting me is another matter." —Sir Winston Churchill

Many field experiments clearly show phosphorus levels can be increased in the soil where fairly large rates of phosphate fertilizers are used. Although plant removal is not as high with P_2O_5 (phosphorus) as it is with K_2O, the efficiency with which plants utilize phosphorus is normally considered low.

In the experiment referred to above, a total of 70 pounds of

P_2O_5 was removed while 240 lbs. of K_2O were removed in the entire production of 1956 alfalfa hay crop. In other experiments, phosphate levels increased from *low to medium when* 60-120 *lbs.* of P_2O_5 were applied annually and to *high* when 180 pounds were used.

Through the use of chemical soil tests, the fertility level of the soil can be maintained at the desired level. Even though sufficient quantities of fertilizers have been used to adjust the soil level to a medium or high level, *the soil resources should be constantly checked.*

Numerous alfalfa fertilization demonstrations have been conducted in Tennessee for the past five years. *These demonstrations have shown the necessity of applying liberal applications of potash.* Not only has this been essential for maintaining the level of potassium in the soil but also for maintaining high yields and good stands.

The life expectancy of an American is now more than 70 years, compared to 48 years a century ago.

On established alfalfa stands where soils tested high in potassium, soil potassium levels dropped from high to medium or low after two or three years of crop removal. **The fertility level** of alfalfa was maintained by applying *100 pounds of K_2O per acre per year where yields of three to four tons of hay were removed.*

It is important to use *sufficient quantities of fertilizers to build up and maintain rather high fertility levels in the soil.* Whether we consider the individual field, the farm, or an entire area, soil testing is the most desirable method for evaluating the existing soil resources and determining the fertility program necessary to insure a profitable operation.

Get Top Yields

Soil fertility as measured by chemical tests must also be interpreted based on yield potential or management Several states suggest two or more levels of fertilization. For example, Iowa suggests three levels of fertilization for corn—minimum, intermediate, and optimum. Minnesota suggests average and extra yields of corn and certain other crops.

Last year Tennessee recommended three levels for corn and cotton. These levels were based on yield potential or soil type.

It is very important to consider *the potential* before making fertilizer recommendations. For example, an *average recommendation* for corn would provide enough nutrients for only 50 to 60 bushels of corn. On soils hav-

ing a yield potential of 100 or more bushels per acre such a recommendation would be insufficient to obtain this yield. *Top yields are best obtained by adjusting the fertilizer use to suit the individual situation.*

Most farmers using soil tests today are not interested in recommendations for average production. The mere fact that they use soil tests indicates they are above average farmers and, therefore, are interested in obtaining top yields consistent with the economic framework in which they are operating.

The average farmer realizes very little net return on the 30 bushels of corn that he produces per acre. *However, the yield average for the top corn producers returns a nice profit.*

Approximately 50 farmers conducted complete corn production demonstrations in Tennessee during 1956 and *averaged about 85 bushels* per acre while the state average was *only 31 bushels* per acre.

According to the best research information available, the average cost of producing 31 bushels of corn per acre in Tennessee is approximately $1.15 per bushel and only $0.55 per bushel where 85 bushels per acre are grown.

Summary

Soil testing is one of the best diagnostic techniques available to farmers for determining the fertility needs of their farms.

Since the discovery of elastic, it is estimated that women take up one-third less space.

Fertility levels can be maintained and built up by using information obtained from soil tests.

Soil testing provides farmers with the latest research information available on lime and fertilizer use.

By following a regular program of soil testing, one can avoid loss in yield and low profits resulting from *hidden hunger.*

How To Determine Land Values Per Acre

To determine the productive value of land, capitalize the going mortgage rate of interest. If the interest rate is 5% and the net return per acre is $20, the land should be worth $400 per acre. However, it's wise to use a combination of the above productivity method with the normal value concept and the current market value to more accurately determine land values. —*Iowa Farm News*

Making A Compost Pile

Read about a much discussed topic — how to make a backyard compost pile . . .

Condensed from Pennsylvania Farmer

R. H. Sudds

HOW do you go about making a compost pile?

Many of us have preached the virtues of the compost pile, but most of us do little about it. The small user of composted soil apparently prefers to pay the price for "African violet soil," "houseplant soil," "cactus soil," and others that come in those little plastic bags.

Making compost is work, which alone makes it unattractive to many. A compost pile is never a thing of beauty although it may be a joy to its owner. While one can make "artificial manure" simply by stacking organic matter, sprinkling it liberally while stacking with a "complete" fertilizer and lime, then keeping the mass moistened, the resulting humus must be mixed with some soil for most uses.

Building the Pile

A wide range of plant parts can be used in composting although diseased ones should be omitted. A layer of coarse material, like cornstalks, may be used to begin the pile and is built up to about six inches thick. The width should be no more than six feet although the length may be as great as desired. On top of the first layer, one of animal manure may be used to not more than six inches in depth. With "hot" manures, like chicken and horse, three or four inches is better. Since manure is not available to many and since some others would not want it anyhow, a heavy sprinkling of a standard grade of "complete" fertilizer plus ground limestone should be applied over the organic layer. The fertilizer is used at about 200 pounds per ton of plant parts and the lime at about 50 pounds per ton. Exact measurements are not important.

The pile is built up in these

Reprinted by permission from Pennsylvania Farmer, Harrisburg, Pennsylvania

alternate layers to a height of three or four feet, with the top left "dished" or concave to catch the rainwater; in dry weather, the pile should be wet down weekly to promote decay. If you have enough material to build the pile all at once, after two months in summertime spade over the mass and repile. Again in four to six weeks, respade and pile again. Compost started late in autumn will decay very little until warm spring weather because of the low temperatures that check the decay organisms. Large-scale users may have several piles of different ages and stages of maturity.

For houseplants that require soil, bring in to the cellar each fall a few bushels of topsoil from an area where you have stacked a manure pile recently. Use vermiculite — which contains only mineral matter—for many plants although that material has the disadvantage of requiring careful use of soluble fertilizers.

The compost pile is associated with rats in the minds of some users. The rodents have an ideal home what with food and shelter all in the shelter area. There is no royal road to the making of a compost pile. However, there is nothing that can quite take its place in some situations.

No Difference in Nitrogen Applications

Applying 66 pounds of nitrogen per acre to grass-legume pasture the past summer boosted forage production 1.92 tons (dry matter basis) per acre at the University of Minnesota Rosemount Station, according to Paul Burson and G. D. Holcomb, University Soils department. Unfertilized pasture yielded 1.06 tons of forage per acre, compared with 2.98 tons from the nitrogen fertilized pasture.

Of added interest was the fact that there was little or no difference in forage or protein yields whether the nitrogen was applied in a single application or a split application, points out Prof. Burson. Part of the pasture area was fertilized with 66 pounds of nitrogen on April 28. Another area received 33 pounds of nitrogen the same date, plus 33 pounds on June 24. In both cases, the forage yields were just under three tons per acre and the protein yields around 140 pounds per acre.

"In some areas, where rainfall is sufficient and well distributed during the summer months, the split application of nitrogen may boost pasture yields during midsummer," Prof. Burson said.

—Minnesota Extension

Care for Pigs Before You See Them

There's always a reason for "tough luck" at farrowing. Take good care of your brood sows and they'll produce large litters of healthy pigs next spring . . .

Condensed from
National Livestock Producer

Stewart H. Fowler, Louisiana State University

FOR those big litters of husky, market-topping pigs that put money in the bank, you will find it wise to start feeding and caring for your pigs before you see them! When a brood sow fails to farrow and raise a large litter, it is more than just "tough luck"—there is a reason. If a sow has only three or four pigs or an undersized and weak litter, or if the sow eats her pigs or fails to provide milk for her litter, these are signs that something was probably wrong with the feeding and handling of the sow while she was developing her pigs.

The brood sow may be considered as a machine—the feed and water she consumes are the raw products, and the pigs produced are the finished product. Like any machine, if the brood sow is to operate in an economical and efficient manner and produce a finished product at near capacity, she must receive the essential raw materials in optimum quantities and must be managed with care. For the sow to accomplish her part in the production of profitable market hogs, she must receive proper and adequate feed and care. This is especially important from two to three weeks prior to breeding until farrowing.

Failures at farrowing time occur more often with spring than with fall litters. This can usually be traced to one or more environmental factors that are more common to fall litters. Among the most important are: Poor or no pasture at all, lack of exercise, insufficient sunshine, and exposure to cold, damp weather. There are, in addition, a number of "nutritional mistakes" that affect both spring and fall farrowing results. These include feeding grain alone, failing to provide salt and other necessary minerals, and not providing sufficient clean drinking water.

Reprinted by permission from National Livestock Producer, 139 N. Clark St., Chicago 2, Illinois

Good feeding and management of brood sows from two to three weeks before breeding until they farrow next spring will definitely improve your pig crop. Sows that get good care and receive the right kind and proper amount of feed will farrow big, strong litters. Big pigs are easier to save and usually get off to a better start and grow faster all through the feeding period.

For each increase of one pound in birth weight, you can expect about a seven pound advantage when the pigs are eight weeks old. Thus, heavier pigs at birth mean more potential profit. A three-pound pig at birth should weigh 40 pounds or more at eight weeks of age and will have several times greater chance of reaching market than a two-pound pig. The three-pounder should go to market 10 to 14 days earlier with a corresponding saving of feed.

Pigs Can Be Too Large

As a word of caution, however, you can get your pigs too heavy at birth for the sow's own good. Excessively high levels of good quality protein in the sow's ration all during pregnancy can result in pigs weighing well over four pounds at birth. Many sows have difficulty in giving birth to such large pigs, and veterinary help may be required. The average birth weight for pigs in this country is 2½ pounds, and there is little advantage to pigs much heavier because of the additional difficulties encountered at farrowing.

The physical condition of the sow or gilt when bred has a definite influence on the number of pigs farrowed. Sows that are excessively fat at breeding time may not "settle;" it is thought that the excess fat may interfere with the normal release and fertilization of the eggs. Even if the eggs are shed and fertilized, recent research indicates that the death loss of developing pigs is greatly increased in overly fat pregnant sows.

The number of pigs farrowed, however, will be increased by "flushing." Have your sows only in moderate flesh condition about three weeks prior to breeding and feed liberally on a well balanced ration so they will gain rapidly during the period before mating. A ration with a protein level of about 18% is desired for best results. There is also real value for about 15% alfalfa leaf meal in the flushing ration—it tends to stimulate the release of additional eggs.

It is theoretically possible for a female mosquito to produce 160 million offspring in a single season. The moral is to swat 'em early.

The liberal feeding of the pre-breeding ration should continue for the first two to three weeks after mating. This allows time for the fertilized eggs to become attached in the sow's uterus. Feed intake should then be restricted and the protein level dropped to about 16%.

The "pay off" for your year's work with hogs depends more on the management and feeding of the sows during pregnancy than on your activities during any other period of the production cycle. The pregnant sow has quite a big job cut out for her. She must not only maintain herself, but she must develop her unborn litter and accumulate a reserve supply of fat to be used during the suckling period. To help her perform this job in satisfactory fashion, extra attention must be given to her ration during the gestation period to see that it provides the proper amounts and right kind of proteins, minerals and vitamins. Correct energy levels are important also, because either too much or too little can be detrimental to best reproductive performance.

The biggest room in the world is the room for improvement.

Pregnant sows need feeds that furnish bulk, and their ration should contain enough of such cereal grains as barley, corn, and oats to keep them in medium flesh and gaining a little weight. The sow's condition largely accounts for the size of her litter and the vigor of her pigs at birth, provided she is mated to a vigorous, fertile boar. A sow that is too fat or too thin may not come in heat. Or, if such a sow does accept the boar, she may fail to conceive, or her litter may be small. Research shows that bred sows on restricted feed intake definitely have less embryonic mortality than more heavily fed sows; that is, fewer of their pigs die between fertilization and farrowing.

The new-born pig's body contains large amounts of protein. Thus, it is essential that the bred sow's ration be rich in this nutrient. Proteins of animal origin, such as tankage, fishmeal, and dairy by-products, contain certain essential amino acids not found in proteins of plant origin. Proteins of animal origin, therefore, are especially valuable for brood sows, and one or more should be included in their protein supplement. Plant proteins, such as soybean meal and linseed meal, can make up a half to two-thirds of the protein supplement, but it isn't advisable to use proteins of plant origin as the only source of protein for bred sows.

Common observation among hog producers indicates that sows on good pasture nearly always have better pigs than those confined to dry lot. This is probably because pasture forage furnishes bulk, protein, minerals, and vitamins and provides an opportunity for sows to exercise and to be out in the sunshine. In fact, lush pasture does such a good job of nourishing the brood sow early in the gestation period that only salt, ground limestone, and a few ears of corn or other grain are all the additional feed needed. As farrowing time approaches, however, more protein must be supplied. During the last six weeks of pregnancy, about one-half pound of protein supplement should be fed per sow daily.

Sows Should Gain Weight

By the third week after breeding, it will pay to regulate the feed in such a way that your sows will gain an average of only two-thirds to one pound per day. The grain and a protein-mineral supplement may be mixed in definite proportions and hand fed in a trough at a rate of 1½ pounds daily for each 100 pounds of live weight of sow, or two pounds daily for each 100 pounds live weight of gilt.

For example, this would mean 4½ pounds per day for a 300-pound sow and five pounds of feed per day for a 250-pound gilt. Keep in mind, however, that this is only a general rule. Fat sows may not need so much, and thin ones may need more. The eye and judgment of an experienced feeder are far superior to any set of rules.

You may prefer to self-feed your bred sows in order to save the detailed and time-consuming labor required in hand-feeding. If so, remember that the sows may get too fat if the ration isn't bulky and high in fiber. For dry lot or winter feeding, a mixture made up of one-third ground shell corn, ground barley, or ground wheat, one-third ground oats, and one-third coarsely ground alfalfa with 200 pounds of a balanced protein supplement added to each ton of the mixture may be self-fed to both gilts and older sows. Minerals may be added to this mixture at the rate of 20 pounds of minerals to a ton of feed, or they may be self-fed separately. Ground ear corn may be substituted for the ground shell corn for old sows. Some swine producers have reported good results in feeding up to 50% of the mix-

Ad in paper—Elderly man who smokes and drinks, would like to meet elderly woman, who smokes and drinks. Object: Smoking and drinking.

ture in the form of alfalfa to old sows.

Although such specially adapted bulky rations can be successfully self-fed to bred sows, there are a number of important factors that favor hand feeding. Greater utilization of pasture and other desirable roughages can be attained. Most important, however, is the fact that the condition of the sows can be more closely watched since you would be seeing your animals twice each day.

Separate Gilts and Sows

When sows and gilts are hand-fed during gestation, 1½ to two linear feet of trough space is needed per gilt or sow. It is desirable that the gilts and heavier sows be separated during the gestation period. Otherwise, the larger sows will tend to "hog" the feed trough and will get more than their share of the feed.

"In politics as on the sickbed people toss from one side to the other, thinking they will be more comfortable."

—Goethe

About 75% of the growth of the developing litter takes place during the last month of pregnancy. The bodies of the unborn pigs consist mostly of protein, minerals and water. Thus, it is essential to feed ample protein supplement and mineral mixture during the last month. If the proteins and minerals needed to nourish and develop the unborn pigs are not fed to the sows, the developing pigs will take them from their mother's body. This results in a run-down sow that suckles poorly. The litter will not get enough milk, and the final result will be a large share of weak, unthrifty pigs and some dead ones. Every pig farrowed dead, or which dies while young, costs at least 140 pounds of wasted feed. This points to one of the major reasons why it is important to provide sows with excellent care during gestation.

Concepts on fertilizing soils are undergoing rapid changes as farmers move from "ordinary" levels of production to the ever higher acre yields required by the economics of modern farming.

Needless to say, clean water should be available to sows at all times. Few farms, however, have adequate supplies of good water for live stock. Until this situation is corrected, it will be impossible for such farms to realize maximum profits from their live stock operations. Even in cold weather it takes over a gallon of water a day to supply the requirements of a brood sow. This amount

will not be consumed if the water is dirty, too cold, or far removed from the place where the sows eat and sleep.

Some type of automatic watering system is the best means of providing a constant supply of fresh water to your sows. A minimum of one automatic watering cup should be provided for each 12 gilts or for each 10 sows. Additional watering space may be needed during hot weather.

Bred sows need to be isolated from the rest of the herd to prevent injuries. They should have shade in the summer and protection from the weather in the winter. A gilt will need about 15 square feet of winter housing and 17 square feet of summer shade. Sows need an additional three square feet of space in summer and winter.

If you like high farm prices, move to Alaska. Prices there are $11 per cwt. for milk; $5 per cwt. for potatoes; and 90c a dozen for eggs. Oats yield 90 bushels; Barley 80 bushels; Wheat 40 bushels per acre. Before you go, have at least $25,000 available to clear your free farm of brush and trees and to meet sky-high production costs.

The worming of sows and gilts prior to breeding is recommended, and sanitary measures should be followed to prevent reinfestation. If it is not possible to worm your sows before breeding, the piperazine compounds can be used to worm the bred sows a couple of weeks prior to farrowing. This latter practice helps prevent infestation of the young pigs. The old standard worming compound, sodium fluoride, should not be used for this purpose, as it is not a safe worming agent for bred sows.

Treat Hogs for Mange

Mange and lice treatment is also recommended during gestation. For the control of mange, lindane may be applied as a spray in a water solution. Add one pound of 25% lindane to 50 gallons of water and cover the animals thoroughly. The treatment also adequately controls lice.

These management pointers have served me well in supervising college swine herds for several years, and they can do the same for you. Feed and care for your bred sows like your profit depended on it—it does! No endeavor succeeds quite so well as the one that is "well begun." And, the real starting point of a well begun hog program is proper care and feed for your pigs before you see them. The old sow will reward you for your efforts.

Should You Fall or Spring Plow?

Both have advantages; depending upon soil type, slope of the land, and when you have the time . . .

Condensed from Wallace's Farmer

FALL or spring plow? Which is best for your farm?

Much farm land is plowed in the fall. Some sloping fields may erode and should not be plowed until spring, however.

"I had to quit fall plowing a few years ago. I was losing too much top soil," reports Earnest Carstens, who operates a rolling farm in north Guthrie county, Iowa.

"But, this fall I'm plowing some land laid out on contour I don't think it will wash as much, and I like to fall plow if possible."

Why Do Farmers Plow in the Fall?

For some, it's mostly to avoid part of the spring rush. There's more spare time in the fall. Crops often can be planted sooner on fall plowing. Some years this is really important.

Many folks have heavy soil which plows better in the fall. If heavy soil is plowed too wet, it may form hard clods.

Some fall plowing is done to get the fertilizer application plowed down before land freezes.

What Land Can Be Fall Plowed?

Fall plowing is recommended for heavier soils that are fairly level.

Land that slopes more than 3 per cent shouldn't be plowed in the fall. However, land that slopes up to 6 per cent may be fall plowed on contour.

Land that slopes more than 6 per cent, may be fall plowed, if properly terraced and other erosion control methods are followed.

Does Fall Plowing Increase Yields?

"Yields have averaged 3 to 5 bushels of corn more on fall-plowed land than on spring-plowed land on the Iowa experiment station agronomy farm," says Joe Stritzel, extension agronomist at Iowa State College.

You can't expect yield increases from fall-plowed, eroded fields, however.

What Effect Does Fall Plowing Have on Soil?

Heavier soils will be mellowed by freezing and thawing in late

Reprinted by permission from Wallace's Farmer and Iowa Homestead, Des Moines, Iowa

fall and early spring. This results in a good structural condition of the soil for the following crop.

If you plow under a heavy growth of clover, or other crop,

A turtle only makes progress when his neck is out.

you build up organic matter which helps soil structure and moisture holding capacity.

When Should Fall Plowing Be Done?

Fall plowing can be done any time. However, if you plan to plow down nitrogen fertilizer, you should wait until after mid-October when temperature of soil is down to at least 50 degrees.

Stritzel cautions that some nitrogen may be lost by leaching when applied too early. Losses will occur even from sources containing mostly ammonium and urea from too early application.

If you need to plow early, move up your phosphorus and potassium application to fit your plowing time.

Experiments show that late September and October plow-down applications of phosphorus and potassium have equalled or bettered disked-in applications in the spring on fall-plowed ground.

Plowing permits deeper placement of the phosphorus and this results in better use of the phosphorus fertilizer, especially during dry spells the following year.

How Deep Should You Plow?

You may have a preference. Or the depth best for your farm may not be best for another

Applying potash to a hay crop at Lexington, Kentucky, produced about $6 worth of hay at a cost of only $3 in extra fertilizer. About 60 lbs. of potash per acre meant the difference.

farm. Normal plowing depth is from 5 to 7 inches, however.

Fall plowing eases spring rush and may increase yields on some land. It also allows fall application of fertilizer. But, if your land tends to wash badly it will pay to do the plowing in the spring.

Feed Losses averaged as much as 45 per cent when poultry feeders were filled to the top, according to studies by Georgia Experiment Station. Wastage dropped to 15 per cent when only two-thirds full, 5 per cent when half full and 2 per cent when one-third full. Researchers suggest automatic feeders should be adjusted to run one-half full or less. *California Farmer*

Mastering Molds In The Soil

Read about these "robbers" in your soil and what research teams are doing to stop them . .

Condensed from Ohio Farm and Home Research

A. F. Schmitthenner, L. E. Williams, and *H. C. Young*

"INVISIBLE" robbers steal millions of dollars from farmers every year. The cheats are certain molds in crop land.

Fusarium fungi which are abundant in midwest soils take a heavy toll of crops. They are to blame for corn stalk and ear rots, for scab of wheat, for seedling blights that cause poor stands, for root rots which result in unthrifty growth of most crop plants.

Affects Alfalfa

Alfalfa seedings often fail due to Pythium fungi in soil. Another fungus known as Phyophthora has wiped out entire soybean fields.

The fungi fall into a unique and favored role as a farmer's enemy. The farmer can see a rat nibbling at stored corn. He can watch rain, falling day after day, drown his crops. But because he cannot see his enemies in the soil—or doesn't even know of their existence—he often disregards them. Poor yields, often the handiwork of soil molds, are chalked up instead to poor seed, bad weather or other vagaries of the farming business.

For centuries the severity of soil borne diseases has been altered by crop rotation. Disease-causing organisms build up when susceptible crops are planted, but they may starve in their absence.

Some scientists have thought that certain crops poison as well as starve out certain disease organisms. However, investigations have shown that the crop plant did not cause death of the pathogens directly, but rather indirectly by building-up the natural enemies (antagonists) of the pathogens in the soil.

Scientists put these natural enemies to work killing plant disease organisms in the laboratory. Biological control, the use of one living organism to control another, had been achieved. Things were not so rosy when it was tried in the field, however, even when large numbers of the

Reprinted from Ohio Farm and Home Research, Ohio Agricultural Experiment Station, Wooster

antagonists were introduced into the soil. The scientists had overlooked the multitudes of microorganisms in the soil which in turn could keep the antagonists from doing their job.

Food Needed

Biological control was effective only when large amounts of special food was applied. Some workers, for example added 10 tons of sugar per acre along with the antagonists to increase their number or alone to increase the number of antagonists already present in the soil. Of course, this is impractical.

It costs N. Y. C. about $200,000 to clean up each inch of snowfall. Many years, they get 25 inches or more.

In a farm field the food for soil microorganisms is furnished by the crop. Different crops supply various amounts and types of food. Therefore, crop rotation may be a practical method of creating soil conditions which are more favorable to the antagonists than to their enemies. Crop rotation also affects soil moisture, aeration, acidity and fertility, which may also bring about changes in microbe numbers.

So, in the future it may be possible to formulate the best combinations of crop rotations and cultural practices to cut down the amount of soil-borne diseases.

Before these diseases can be controlled by antagonistic action, numbers and kinds of the microorganisms in crop soils and their effect on each other must be determined.

At the Ohio Agricultural Experiment Station the first group of soil microorganisms to be studied were the molds. Although the soil is teeming with fungi, they cannot be seen with the naked eye. Even with the microscope, direct examination of soil is not suitable because of difficulty in differentiating between living and dead fungus structures and organic particles. Besides, when soil is prepared for microscopic identification of fungi, the reproductive structures necessary for identification are disorganized. Therefore, the fungus must be transplanted into an environment where it can grow undisturbed. Pieces of soil or dilute soil suspensions are placed on agar, seaweed jelly, which contains the proper food substances for fungus growth. If relatively large soil particles are used only the fungi growing from the surface can be observed, and their intermingling often prevents proper identification and counting. When dilute soil suspensions are used, the soil particles are divided so that fungus colonies which develop are separated for

easy counting and identification.

Technique Developed

Due to disadvantages in previous methods, a modified dilution-plate technique was developed at the Experiment Station. A representative soil sample is collected from a field by mixing together a large number of samples. A small amount of this mixture is suspended in a viscous liquid and diluted 10,000 fold. Small amounts of this are measured out and mixed with agar medium which gels when cooled. The agar also contains sugar, yeast extract, and minerals to feed the fungus, antibiotics to destroy unwanted organisms, and mold inhibitors to reduce the spread of the more rapidly-growing fungi which often crowd out slower-growing types. After a suitable growth period, the fungi are counted and identified.

500 Samples Studied

Over the past 3 years about 500 soil samples have been studied and 75,000 fungus colonies identified. These 75,000 fungi were representatives of 130 different groups, the majority of which consist of more than one species.

As many as 200,000 of these and other fungi may live in a gram of soil. Most of these different types of fungi were isolated from all three of the soil types studied: Wooster silt loam, Toledo silt clay and Brookston clay loam. Cropping history of the land seemed to have a bearing on differences in number of kinds of fungi in each soil type.

Relationship Revealed

Now that techniques have been developed to study the patterns of soil fungi, it will be possible to relate the severity of soil-borne diseases of crops to specific soil fungus populations. It will also be possible to determine the factors which control the distribution of soil fungi. Once this has been accomplished, populations of soil fungi can be manipulated to decrease disease severity.

World's Leading Meat-Eaters — Although people in the United States rank among the world's foremost meat-eaters, they consume considerably less red meat than the average person in several other countries. Argentine citizens ate an average of 242 pounds per person in 1957, compared to 159 pounds per person in the United States. New Zealanders averaged 229 pounds, and Australians followed closely with 221 pounds each. Uraguayans, who ate 168 pounds per person, were the only others to exceed the U. S. per capita meat consumption. —*Louisiana State University*

ONE YEAR CONTINUING INDEX

BEEF CATTLE

Lasater Breeds for Beef .....April 1958
Weight Steers Lose in Transit ...April 1958
Pay to Dehorn Steers? .....May 1958
The Beef Cattle Cycle .....May 1958
Beef Cow Herds in Corn Belt .....July 1958
Green Chop for Beef .....Aug. 1958
Outlook for Beef Cattle .....Oct. 1958
Can't Afford Beef Cows .....Oct. 1958
Happy Days for Cattlemen .....Nov. 1958
Control Feedlot Diseases .....Nov. 1958
Tough Question for Cattle Feeders .Nov. 1958
Give Us More Crossbreds .....Dec. 1958
Half A Ton More Beef .....Dec. 1958
Measuring Fat in Beef .....Jan. 1959
Cattlemen See Research .....Feb. 1959
Steer of Tomorrow .....Feb. 1959
What Costs to Feed Beef Cow ....Feb. 1959

CONSERVATION

Conservation Reserve Program ....May 1958
Smooth Out Rough Spots .....Nov. 1958
Upside Down Land .....Dec. 1958
Beef Cattle Finance Soil Improvement Dec. '58
Can You Pay to Rebuild Farm ....Feb. 1959

CROPS

Seed Treatment, Low-Cost Insurance April 1958
Steps to Higher Soybean Yields ..April 1958
Convert to Wheeltrack Corn .....April 1958
Give Up Oats? .....May 1958
Work Less, Save $5 an Acre ....July 1958
Corn Nitrogen Guide .....July 1958
Corn without Cultivation .....July 1958
Boost Corn Yields .....July 1958
100 Bushel Corn Prescription .....July 1958
Dwarf Corn, New Varieties .....July 1958
Money With Your Corn Planter ...July 1958
Your Trouble, Nematodes .....Aug. 1958
Sorghum Won't Drown Out .....Aug. 1958
Drying Grain in Storage .....Aug. 1958
Rotations Obsolete? .....Nov. 1958
Bigger Wheat Yields .....Nov. 1958
Soybean Diseases .....Nov. 1958
Cotton Without Cultivation .....Dec. 1958
No. 1 Soybean Threat .....Dec. 1958
Crashed 200-Bushel Corn Barrier ..Dec. 1958
The Blackbird Problem .....Dec. 1958
Protect Stored Corn .....Jan. 1959
Mechanized Cotton .....Feb. 1959
Corn in 21-Inch Rows .....Feb. 1959

DAIRY CATTLE

Cut the Feed Bill .....April 1958
Feed Cows Once A Day .....April 1958
Dairy Revolution .....May 1958
Machine Milking .....May 1958
Dairy Outlook .....July 1958
What Is 10-Gallon Cow? .....Aug. 1958
Special Milk Program .....Oct. 1958
How Raven Set Record .....Oct. 1958
Plus for Small Herd .....Oct. 1958
Making Money with Dairy Herd ...Oct. 1958
Dairyman's Dilemma .....Oct. 1958
Hardware and Calving .....Oct. 1958
When to Breed Problem Cow .....Oct. 1958
Milk Fever .....Oct. 1958
Testing Butterfat Tricky .....Oct. 1958
Think You Know Cows .....Oct. 1958
Milk Check Without Milking .....Oct. 1958
What's Fat' Freshening Worth? ....Oct. 1958
In Store for Dairying .....Oct. 1958
Will You Order Heifer Calves Only? Oct. 1958
Feeding, Managing Dairy Calves ..Oct. 1958
Can Best Cow Have Several
Calves A Year? .....Oct. 1958
Coddle Dairy Calves .....Nov. 1958
Dairy Cow and Balanced Ration ..Dec. 1958
Breed Dairy Heifers by Weight ....Dec. 1958
Automation and Dairy Profits .....Dec. 1958
Parlors vs. Stanchions .....Dec. 1958
Menace of Mastitis .....Dec. 1958
How Co-op Milking Barns Work ..Dec. 1958
Artificial Breeding of Age .....Jan. 1959
Pie-Shaped Dairy Lots .....Jan. 1959
Ventilate Your Dairy Barn .....Feb. 1959
Herringbone—Cow Barn Fashion ..Feb. 1959
Our Cows Must Have Twins .....Feb. 1959

FARM BUILDINGS & SHOP WORK

Renk's Giant Trench Silo .....July 1958
Should You Store Corn .....July 1958
The Power Saw .....Nov. 1958
Bull Pen Makes Silo .....Nov. 1958
Keep Tractor Costs Down .....Nov. 1958
Couldn't Afford Old Buildings ...Nov. 1958
An Eye on the Wire .....Dec. 1958
Make Posts Last Longer .....Jan. 1959

FARM MANAGEMENT

Losing Ag Race to Russians? ....April 1958
Integration in Farming .....April 1958
Is Agriculture Paying Too Much Tax May 1958
Agriculture in 1965 .....May 1958
When Dairying Shows Profit .....July 1958
Corn Costs Money .....July 1958
Red Ink, Rich Earth .....Aug. 1958
Soil Bank Changes .....Aug. 1958
Ease Livestock Load .....Aug. 1958
More Land? .....Aug. 1958
Subsidize Cotton Exports? .....Aug. 1958
Philosophy of Stock Farming .....Oct. 1958
Are Corn Prices More Stable? ....Nov. 1958
New Farm Law .....Nov. 1958
Why Southerners Scouted Corn Belt Nov. 1958
Will There Be Enough Farmers? ..Dec. 1958
Family Farm in Changing Ag. ....Dec. 1958
Contract Farming in Hen House ...Jan. 1959
Farm Outlook for 1959 .....Jan. 1959
Will You Get the Loan? .....Jan. 1959
Take a Farm Inventory .....Jan. 1959
Use Market News .....Jan. 1959
New Packers, Stockyard Act .....Feb. 1959
Social Security Important .....Feb. 1959
Small Farms Make Profits .....Feb. 1959

FARM EQUIPMENT & MACHINERY

Selecting A Tractor .....April 1958
Make Idea Pay Off .....April 1958
Mothball Your Corn Planter .....July 1958
Drying Grain in Storage .....Aug. 1958
About Labor Saving .....Oct. 1958
New For You .....Oct. 1958
Agriculture's Air Wing .....Nov. 1958
Plow Like a Champion .....Nov. 1958
Change to Crop Drying .....Dec. 1958
Tractor Power Steering .....Dec. 1958
Tractor Motor Oils .....Jan. 1959
Systematize Livestock Feeding ....Jan. 1959
Keep Eye on Generator .....Feb. 1959

FEEDS

Feed Once A Day .....April 1958
Implant Hormones or Feed Them? April 1958
Balance Rumen and Ration .....May 1958

ONE YEAR CONTINUING INDEX

Tranquillizers, Bigger Profits .....May 1958
Pellets, Important New Look .....July 1958
Pelleted Rations—Feed of Future ..Oct. 1958
Watch Out for Soft Corn .....Nov. 1958
Pellets or Wafers .....Nov. 1958
Feed to Cut Poultry Costs .....Jan. 1959
Surprising Pelleted Feeds .....Feb. 1959

FERTILIZERS

First Stilbestrol, Now Tapazole ...May 1958
Fertilizer Placement Important ....July 1958
Corn Nitrogen Guide .....July 1958
Stop Wasting Manure .....Feb. 1959

FORESTRY

Charcoal from Your Woodlot .....Dec. 1958
More Money from Orchard .....Jan. 1959

FRUIT

Dwarfs in Your Backyard .....April 1958
Chemicals Th.n Peaches .....Feb. 1959

HAY AND HAY CROPS

Spotted Alfalfa Aphid .....May 1958
How To Feed Hay .....May 1958
Hay Crushers Cut Field Risks .....July 1958
What Does Hay Cost? .....Oct. 1958
High Quality Roughage .....Oct. 1958
Don't Let Hay Wait .....Oct. 1958

HOGS

Hog Contract Farming .....April 1958
Prospects for Pig A.I. .....April 1958
Leasing Hog Breeding Herds .....April 1958
Pigs, Prices, Politics .....April 1958
47 Ideas for Hog Profits .....May 1958
New Gains from Pellets for Swine May 1958
Ailments of Little Pig .....July 1958
Sell Hogs Year Round .....July 1958
Litter Sets New Record .....Aug. 1958
Good Fall Prices, Trouble in '59 ..Aug 1958
Raising Pigs in Parlor .....Aug. 1958
Hot Weather, Fall Farrowing ....Aug. 1958
Learn About Pigs from Danes ....Aug. 1958
Modern Hog Farming .....Oct. 1958
Making Money with Hogs .....Nov. 1958
Pig Report Spells Danger .....Nov. 1958
Hot on Hybrids .....Dec. 1958
Parasites Eat Up Pig Profits .....Dec. 1958
Breed Leanness Into Hogs .....Dec. 1958
Breeders Must Test Boars .....Dec. 1958
How Pig Crop Reports Are Made ..Dec. 1958
Making Hogs Pay .....Jan. 1959
Good Pork, Cheap .....Feb. 1959
Take Risk Out of Hogs .....Feb. 1959
Swine Fit Any Farm .....Feb. 1959

IRRIGATION

Is Irrigation for You? .....May 1958
Shaping Land for Irrigation .....May 1958
Can You Afford to Irrigate Corn? ..July 1958

INSECTS AND INSECTICIDES

Corn Planter Control Insects .....April 1958
Corn Borer Population High .....April 1958
Spotted Alfalfa Aphid .....May 1958
Insecticide Protection for Corn ....May 1958
Controls for Corn Insects .....July 1958
Insects in Stored Grain .....Nov. 1958
Built-In Bug Resistance .....Dec. 1958

PASTURES

Don't Discount Bluegrass .....April 1958
Control Grazing, Get More Pasture July 1958
Strip Grazing, More Milk .....Aug. 1958
Easier Pasture Renovation .....Oct. 1958
Which Pasture System? .....Oct. 1958
Zero Grazing in Britain .....Oct. 1958
More Beef from Grass .....Nov. 1958
More Milk from Fewer Acres .....Feb. 1959

POULTRY

New Poultry Inspection Law .....April 1958
Contract Egg and You .....Aug. 1958
Ducks, Ducks, Ducks .....Aug. 1958
Up-To-Date Flock Manager .....Nov. 1958
Egg Production and Morning Lights Jan. 1959
Caged Layers in New York .....Jan. 1959
Hens Need Light .....Jan. 1959
Roostless Houses .....Jan. 1959
Started Pullets .....Jan. 1959
What's Ahead for Broilers? .....Jan. 1959
More Eggs, Less Feed .....Jan. 1959
Feed to Cut Costs .....Jan. 1959
Plump Turkeys, Less Protein .....Jan. 1959
Slat Floors for Hens .....Jan. 1959
Brooding Chicks .....Jan. 1959
Ahead for Poultry .....Jan. 1959
Crowding Layers Profitable .....Feb. 1959
More from Clean Eggs .....Feb. 1959

SHEEP AND GOATS

Early Lambs Make Most Money ...May 1958
How Hazardous Lamb Feeding ....July 1958
Birth of a Lamb .....Aug. 1958
Increase Lamb Crop .....Aug. 1958
New Look in Sheep .....Nov. 1958
Sheep Records Speak .....Dec. 1958
Long or Short Wool? .....Jan. 1959
Alfalfa-Corn for Lambs .....Feb. 1959
Vitamin D for Lambs .....Feb. 1959

SILAGE

Cows Sleep, Eat on Silage .....April 1958
Good Silage Put Up Fast .....May 1958
Corn Silage Year Around .....July 1958
Renk's Giant Trench Silo .....July 1958
Silage in England .....Aug. 1958
Latest on Bunker Silos .....Aug. 1958
Silage Made in Mound .....Aug. 1958
Handy Silage Moisture Test .....Oct. 1958
New Plastic Silo Covers .....Oct. 1958
What Happens in Silo? .....Nov. 1958

SOILS

Hold Quick Blow Soil .....Aug. 1958
Can Fertility Cut Pests, Disease? ..Aug. 1958

VETERINARY

Bloat .....May 1958
Scouring Is Your Fault .....May 1958
Abortions from Marshland Weeds ..July 1958
More About Bloat .....Nov. 1958
Lepto a Major Threat .....Dec. 1958
Inherited Non-Lethal Traits of Cattle Feb. 1959
Oil and Bloat .....Feb. 1959
Controlling Reproductive Cycle ....Feb. 1959
Cattle Breeding Tips .....Feb. 1959

WEEDS

Killer for Weeds in Soybeans .....May 1958
New Weed Materials, Methods ...May 1958

MISCELLANEOUS

Gophers Flee from 2 4D .....July 1958
Yankee Oysters, Japanese Girls ...Dec. 1958
American Visits Russian Farm .....Jan. 1959
Ancient Beekeeping .....Feb. 1959

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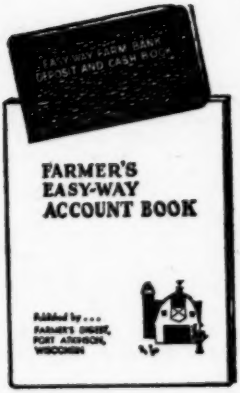

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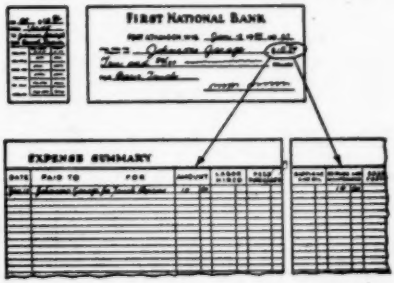

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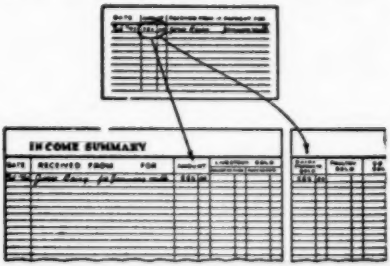

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